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JOURNAL



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THE AMERICAN MUSEUM OF NATURAL HISTORY

# American Museum of Natural History

Seventy-seventh Street and Central Park West, New York City

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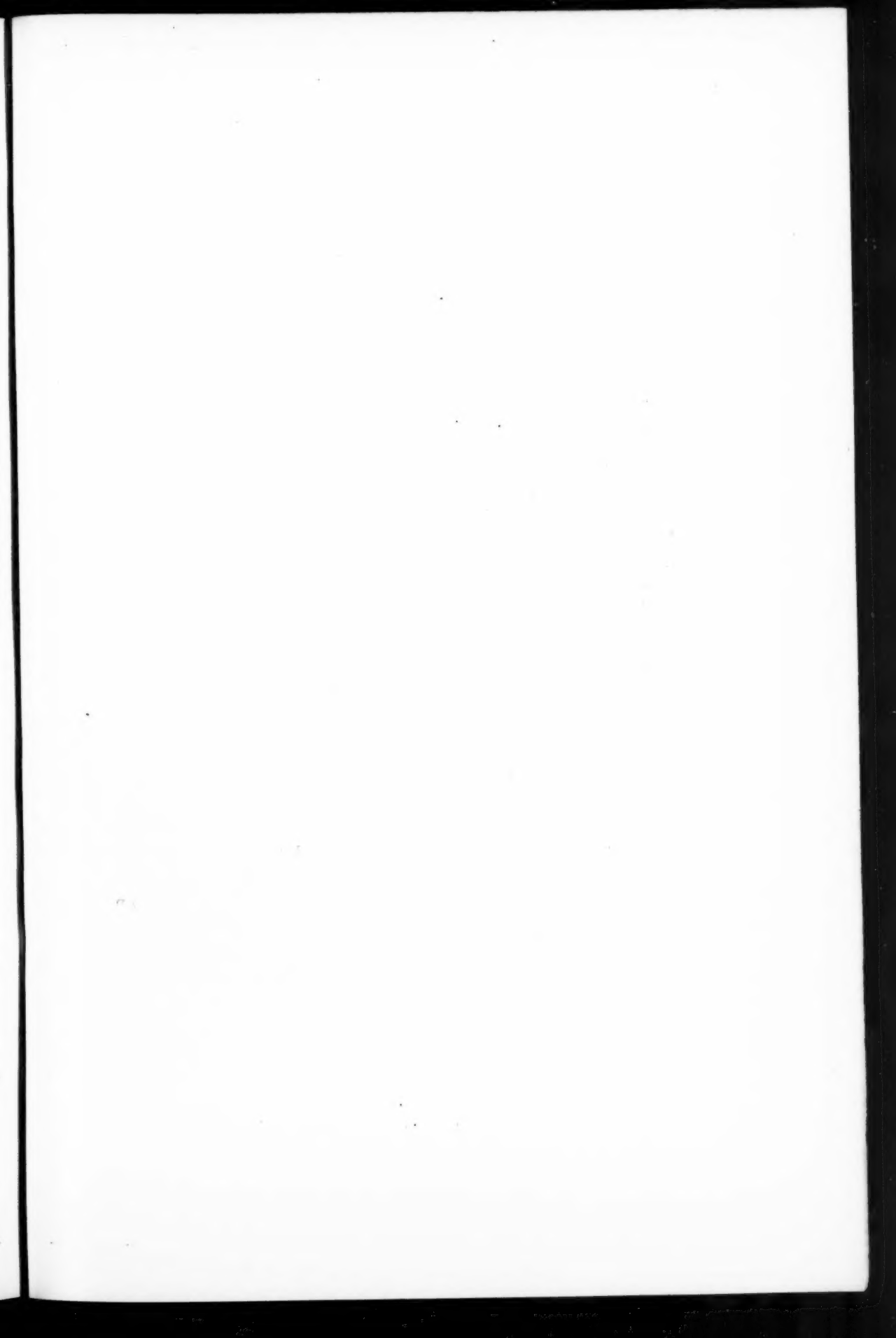
THE AMERICAN MUSEUM OF NATURAL HISTORY was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world.

The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Life Members.....	100	Patrons.....	1000

All money received from membership fees is used for increasing the collections, and for developing the educational work of the Museum.

The Museum is open free to the public on Wednesdays, Thursdays, Fridays, Saturdays and Sundays. Admittance is free to Members every day.





CALIFORNIA MOUNTAIN PARTRIDGE  
From Group in Museum



# The American Museum Journal

VOL. IV.

OCTOBER, 1904.

No. 4

## NEW GROUPS OF GAME BIRDS.



THE acquisition of a complete series of groups of North American game birds showing the nests with their natural surroundings, and eggs or young birds, has been rendered possible through the generosity of friends of the Museum. The Ruffed Grouse, Bob-white and Woodcock being local species, they have been for some time represented in our group collections, but with the funds now available it is proposed to add the game birds of other parts of the country.

Three groups of the proposed series have already been placed upon exhibition, the California Valley and Mountain Partridges, or "Quail," (*Lophortyx californicus* and *Oreortyx pictus plumiferus*), and the Sierra Dusky or Blue Grouse. In each instance a pair of adult birds is shown with their nest, young and a photograph of the nesting site.

The young in the group of Valley Partridge, or "Valley Quail," as it is commonly called in California, are less than a day old, but their well-grown, downy plumage illustrates very well the high degree of development attained by the young of all gallinaceous birds before hatching. The young in the Mountain Partridge, or "Mountain Quail," group are probably a week older, but already have acquired their second plumage and with it the power of flight. The young of the Grouse are in a corresponding stage of plumage.

As to color it will be observed that the plumage of the young of all three species is of dull neutral tints which render the chicks inconspicuous through a more or less close resemblance to the prevailing tone of their surroundings. The female Grouse is also protectively colored and differs strikingly in plumage from her

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mate, who, it is interesting to note in this connection, does not assist in the task of incubation, and, in fact, is far more arboreal in habits than the female.

This Sierra Grouse, it should be remarked, proves to be a heretofore undescribed geographical race or subspecies of the Dusky or Blue Grouse inhabiting the mountainous portions of the western United States. It was previously supposed that Grouse from the Sierras were similar to those of the coast region from Oregon to Alaska, but comparison of specimens shows that the Sierra Grouse differs from both the Coast Range and the Rocky Mountain forms and although the variety more closely resembles the latter than the former, it has evidently been derived from the Coast Range bird of which it is a paler, southern representative. The new Grouse has been named *Dendragapus obscurus sierrensis*.

A fourth California group, though not of a game bird, may be mentioned in the present connection. It shows a family of Yellow-billed Magpies with their bulky, domed nest, a structure so large that two small villages were visited before a box big enough to transport it safely was found. This species has a most restricted range in the foot-hills of the Sierra and Coast Ranges in middle California, and is yearly decreasing in numbers through its habit of eating ground squirrels which have been poisoned by farmers.

Groups of these vanishing species are especially desirable and the Museum is exerting itself to secure, while there is yet time, material which shall show satisfactorily the nesting habits of those of our birds which are rapidly nearing extinction.

F. M. C.

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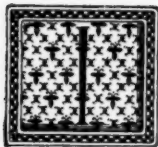
MR. WALTER GRANGER of the Department of Vertebrate Paleontology reports having had good success in finding the small and rare mammals of Eocene age for which he has been searching in southwestern Wyoming. He likewise has obtained the material to complete a skeleton of *Uintatherium*, one of the enormous mammals which characterized the middle Eocene beds of the central west.



CALIFORNIA VALLEY PARTRIDGE  
From Group in Museum

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### SOCIAL PARASITISM AMONG ANTS.



IN an article published in last year's volume of the Bulletin of the American Museum, the author called attention to the occurrence of certain very diminutive females, or queens, in a species of ant (*Formica microgyna*) from Colorado and Utah.

Unexpected light was thrown on this interesting reduction in the size of the queen by a recent study in the Litchfield Hills (Conn.) of another ant (*F. difficilis*) which is known to have similar queens. Several peculiar mixed colonies were found, each consisting of a fertile queen of *F. difficilis*, either singly or accompanied by a few young workers, living in colonies of another ant (*F. incerta*). Afterward the fact was established, both by observation of the natural colonies and by keeping the ants in artificial nests, that the *difficilis* queen, being too small to bring up her own colony, enters a queenless colony of *F. incerta*, and then turns over her first batch of young to be brought up by the *incerta* workers. As the *difficilis* colony grows to be more and more populous, it gradually emancipates itself from the *incerta* and finally becomes a pure *difficilis* colony, the workers of which are as bold and pugnacious as the queen and her first offspring were timid and conciliatory.

These observations show that *F. difficilis* is a true cuckoo ant, a temporary parasite. All the mixed colonies of ants have hitherto been tacitly regarded as permanent unions or consociations of two species, like the slave-making ants and their slaves, or auxiliaries. The case of *F. difficilis* throws light on a whole series of mixed colonies which have been called abnormal or accidental, merely because they have not often been seen, like the mixed colonies of *Aphænogaster tennesseense* and *A. fulvum*; *Formica exsectoides* and *F. subsericea*; *F. dakotensis* and *F. subsericea*; and the European as well as the American *F. rufa* and *F. fusca* with their varieties. In all these cases it is highly probable that we are concerned with a normal temporary parasitism of one species of ant on another. The species of *Formica* which exhibit this method of founding their colonies all belong to the

## COLLECTING IN FLORIDA AND THE BAHAMAS

*rufa* and *exsecta* groups, and the forms in whose nests they establish these colonies belong to the more abundant species of the *fusca* and *pallide-fulva* groups. Another ant of a very different sub-family, namely *Aphaenogaster tennesseense*, curiously enough, shows a similar reduction in the size of its queens and it too, as certain cases show, in all probability first establishes its colonies in the nests of some one of our numerous varieties of *A. fulvum*. A full account of the temporary parasitism of *F. difficilis* and of several other species will shortly be published.

WILLIAM MORTON WHEELER.

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### A COLLECTING TRIP TO FLORIDA AND THE BAHAMAS.



THROUGH the generosity of Mr. Nathan A. Bill of Springfield, Massachusetts, the schooner yacht "Gloria" was placed at the disposal of the Museum in May and June for a collecting expedition in the Florida Keys and the Bahama Islands. Professor William Morton Wheeler of the Department of Invertebrate Zoology and Mr. Frank M. Chapman of the Department of Ornithology and Mammalogy embarked on this vessel at Miami, Florida, May 4, 1904, and on May 31 were joined at Nassau, Bahamas, by Dr. B. E. Dahlgren of the Department of Preparation and Installation.

Among birds, material for groups of the Roseate Spoonbill, Snowy Egret, Ani or Black Cuckoo and Flamingo were especially desired. The two former, it was hoped to find in Florida, while the latter were to be looked for in the Bahamas.

The attempt to find the nests of the Spoonbill and Egret resulted in failure. The few Spoonbills known to inhabit an isolated rookery near the southwestern border of the Everglades were reported by the game warden employed by the American Ornithologists' Union and the Florida Audubon Society to have bred at an unusually early date, while the Egrets inhabiting the same rookery had been killed by a band of plume-hunters. It is evident therefore that so long as a single aigrette-bearing heron remains in Florida, it is liable to be pursued for its plumes. As

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a result of this merciless persecution during the season of reproduction, the early extinction in Florida of both these species is assured.

Several days were spent in cruising on the "Gloria" among the Florida Keys, collecting marine and terrestrial invertebrates. The insect fauna peculiar to the mangrove thickets that cover the island was investigated whenever it was convenient to land. The



STAR FISH—A HALF HOUR'S COLLECTING AT ANDROS ISLAND, BAHAMAS

ants, especially, proved to be of great interest, since they have been compelled in these regions to adapt themselves to an arboreal life; living in the hollow dead twigs of the mangroves and between the bud scales of the singular epiphytic *Tillandsias*.

May 9 the schooner returned to Miami and thence started for the Bahamas. It reached the northern end of Andros Island May 12. From this date till June 30 the work of the expedition was confined to Andros and New Providence Islands and the adjacent keys of the Bahama group.



## COLLECTING IN FLORIDA AND THE BAHAMAS

In the Bahamas, Mr. Chapman's search for birds was very successful, and a detailed report of the hunt for nesting Flamingoes, their discovery, and the subsequent study of their before almost unknown home-life will appear later. In due season it is proposed to exhibit a large group of these remarkable birds fully illustrating their nesting habits.

The offer of a small reward in the local Nassau newspaper caused a large part of the idle population of New Providence to



CORALS AND SEA FANS—AN HOUR'S COLLECTING ON ANDROS REEF, BAHAMAS

take to the field in a search for the nest of the Ani (*Crotophaga ani*) or as it is locally called, Blackbird or Carrion Crow. The Ani is in truth a Cuckoo whose nesting habits are, so far as known, unique among birds. From three or four to ten or twelve Anis are usually associated throughout the year. On the approach of the breeding season in June, the birds do not pair, but all unite in building a common nest in which the females of the flock lay their eggs. The number of eggs deposited by a single individual is unknown, but as many as thirty eggs have been found in a single

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nest. Incubation is evidently shared by all members of this communistic family and the care of the young is also a common duty. Nests, eggs, adults and young were secured which will fully illustrate the nesting habits of this interesting bird.

Material was also gathered for a group of white-crowned Pigeons and numerous specimens of Bahama birds were added to the study collection.

Professor Wheeler and Dr. Dahlgren devoted their time to collecting and observing the marine and terrestrial invertebrates. Careful color sketches were made of many of the marine species, with a view to reproducing their living portions in the exhibition collections of the Museum. Some of the larger marine mollusks were modeled from life and drawings made of them. Specimens embodying the results of these studies are in course of preparation and will soon be on exhibition. Materials were also obtained for a group of the land-crabs so characteristic of tropical Florida, the Bahamas and other islands of the West Indies.

The coloration of the corals was found to be rather dull; various shades of yellow predominating, and a bright green or black being seen only occasionally. The coloration of the sponges, on the other hand, is of a most brilliant nature, ranging from bright yellow, orange, red and even vivid purple to a deep black. By the aid of the notes obtained it will be possible to restore accurately the color of a great number of the specimens in the sponge collection, thus giving some idea of their remarkable appearance in a living condition.

Among terrestrial invertebrates Professor Wheeler collected a fine series of mollusks (mainly of the genus *Strophia*) to illustrate geographical distribution and variation, many Myriapoda and Arachnida (chiefly Opilionidæ) and practically complete series of the ants (Formicidæ) of Andros and New Providence Islands. Only four or five species of Formicidæ have been described from the Bahamas. About 50 species, including several new ones of interest in connection with the ant faunas of Cuba and Florida, were taken on the two above-mentioned islands and the adjacent keys. Many of the species have become singularly modified in their habits. Owing to the very small amount of soil on Andros



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and New Providence, nearly all the species have taken to living in the hollow twigs of trees or even in the culms of grasses and sedges. It was only after this fact was discovered that collecting these insects became profitable and interesting.

Dr. Dahlgren's studies were particularly valuable as indicating the desirability and feasibility of reproducing an entire coral reef in the Museum. Such a reef would present a remarkable sight, with its immense masses of corals, with its twenty-five or more species of sea-fans of wonderful beauty, with its flower-like actinians, with its sponges, extraordinary in their brilliancy of coloring, and with its whole world of moving creatures,—enormous holothurians, large mollusks, star-fishes, long-spined sea-urchins and crustaceans and its tropical fishes of every color of the rainbow.

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## THE LIBRARY.



URING the past year and a half the Library of the Museum has undergone a complete revision. A large proportion of the volumes and separate articles have been catalogued in both author and subject systems. There are on the shelves upwards of 60,000 volumes, dealing with Natural History subjects in both technical and popular style, the whole constituting the best reference library in this branch of science which is to be found in New York City.

More than 400 periodicals are regularly received, representing all branches of science, but more particularly Natural History. New books and periodicals are being constantly added by gift, exchange and purchase. Among the most noteworthy of recent accessions are complete sets of the "Transactions of the Royal Society of Edinburgh," "Journal of the Bombay Natural History Society," Royal Servian Academy's publications, "Fauna und Flora des Golfes von Neapel," and the "Archiv für Anthropologie."

The Library of the New York Academy of Sciences is also on deposit at the Museum. This contains many rare and valuable

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publications and is especially rich in early numbers of many periodicals now entirely out of print.

The books and periodicals of both libraries are available to the public in the Reading-room, which is open from nine to five daily except Sundays and holidays.

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### THE CIRCULATING LOAN COLLECTIONS OF NATURAL HISTORY SPECIMENS.



HE work of providing the Public Schools with collections to assist in nature study, which was begun in December, 1903, has been continued through the school year. In this period of six months, more than one hundred collections have been in circulation and have been used in one hundred schools in Greater New York. They have been delivered throughout the boroughs of Manhattan, the Bronx, Brooklyn and Richmond.

For general information a record has been kept which shows the itinerary of each collection and the number of pupils that have studied it in each school. These numbers are furnished by the principals, and the records show that the collections were studied by the following number of pupils:

Birds	{ Spring, 42,227 Fall, 54,367 }	.....	96,594
Insects.....			34,071
Mollusks.....			10,870
Minerals.....			10,094
Crabs.....			7,428
Starfish.....			6,523
Sponges.....			2,393
Total.....			167,973

Thus in the six months that the collections have been in circulation they have been studied by 167,973 pupils. Their usefulness is attested by the many letters of thanks and appreciation which have been received from teachers and pupils, with

## CIRCULATING LOAN COLLECTIONS

the earnest request that the Museum continue the work the coming year.

The way in which the collections have been utilized in the schools is shown by the following extracts from teachers' letters:

"The birds were used for nature lessons and in connection with oral language, writing dictation, color and drawing lessons."

"I should say on the average 1000 children have observed and examined the specimens. Miss O'Brien has been giving a short lecture before the school on the different specimens and started with the crustacea. Her talk is given weekly and the specimens are put right in the children's hands and are passed so each child can see for itself. She talks to eleven assembled classes, making an average of about 500 or 600 children. The teachers then have short compositions written in their class rooms upon Miss O'Brien's talk and in the lower classes an oral review is made. She has lectured on crustacea, starfishes, sea urchins, sponges and corals."

The birds and insects are in greatest demand, as the study of them is required in several grades. There are forty collections of the former, consisting of five birds each and representing twenty species of our more common birds. The following is the itinerary of Collection No. 8, consisting of the Blue Jay, Woodpecker, Crossbill, Junco and English Sparrow.

### RECORD OF CIRCULATING COLLECTION NO. 8.

#### BIRDS.

Date Received.	Length of Time Retained.	No. of Pupils Studying.	School.	Name of Principal or Teacher.
Nov. 30	5 Weeks	2,000	P.S.M.- 25	Matilda Skene.
Jan. 4	4 "	1,450	P.S.M.-105	Carrie W. Kearns.
Feb. 4	3 "	550	P.S.M.- 13	Sarah A. Robinson.
Mar. 2	4 "	1,050	P.S.M.-174	Elizabeth I. Hoper.
Apl. 7	4 "	500	P.S.M.-120	E. Conway.
May 4	4 "	2,018	P.S.M.- 13	Sarah A. Robinson.
June 2	3 "	950	P.S.M.- 12	Teresa C. Burke.
		8,518		

The popularity and usefulness of these circulating collections were further attested by the demand for them in the Vacation

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Schools. Requests for these collections were received from 33 of the Vacation Schools—18 in Manhattan and 15 in Brooklyn—and during the summer 49 of our collections were loaned to them. These were studied by nearly 25,000 children in the four weeks that they were in circulation. The letters from the principals and teachers speak of the great enjoyment and profit the children have obtained from them.

The entire expense of providing the collections and of delivering them at the schools, as well as that of transferring them from one school to another, is borne by the Museum. G. H. S.

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### THE STUDY COLLECTION OF BIRDS.

WITH the acquisition of the George B. Sennett collection of birds, numbering some 8,000 specimens, the study collection of birds is made to comprise more than 80,000 specimens, with the result that in this country the American Museum collection is second only to that of the United States National Museum. The whole series is being re-arranged and catalogued, so that it may be available for use by students and specialists. It forms the Museum reference library of bird life. It occupies two large rooms on the top floor of the building and is an interesting and tangible evidence of the growth of the Museum in the line of material suitable for research work. Twenty years ago one of the rooms now used for this study collection served as the lecture hall for the beginning of Professor Bickmore's courses of lectures to teachers and not one specimen of the present great collection was in the Museum.

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### MUSEUM NOTES.



THE new wing for the reception of the power plant of the Museum building has been completed and the machinery has been installed. The dynamos which have been placed in this structure are capable of providing amply for the present needs of the Museum. The wing has been arranged in such a manner as to

## MUSEUM NEWS NOTES

form an attractive exhibit of the production of power from steam and its transformation into electricity. The Members of the Museum and the public in general are cordially invited to examine this portion of the building. The contract for the construction of suitable approaches to the power wing has been let, so that the new wing will soon be easily accessible.

THE Eighth International Geographic Congress, which began its meeting in Washington on September 8, held two days of sessions, September 13 and 14, as the guests of the American Museum. The work of the Congress was divided among twenty-one sections and sub-sections and the several lecture and assembly rooms of the building were utilized in accommodating the Congress. A further account of the meetings of the Congress is necessarily deferred to a later issue of the JOURNAL.

A REPRESENTATIVE collection of ethnological material from the native tribes of Siberia has been presented by President Morris K. Jesup to Nicholas II., Czar of Russia, in recognition of the aid and encouragement shown by His Imperial Majesty in the early years of the Jesup North Pacific Expedition.

THE installation of the extensive collections from Peru illustrating the pre-Columbian and immediately succeeding life of that interesting country has advanced to a point where the hall has been thrown open to the public. The collections are arranged primarily in several series to enable the visitor to make ready comparisons between the different centers of population as to their domestic and tribal relations and occupations. The series comprise particularly rich illustrations of decorative and other art in pottery and weaving.

MR. GEORGE H. PEPPER of the Department of Archæology has been in Arizona and New Mexico collecting textiles and scientific data concerning them from among the Navajo, the Hopi and other Pueblo tribes. One of the objects of the expedition was the study of an intrusive culture in northeastern New Mexico. The towns here are commonly known as "Mexican" settlements, but

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there is a great infusion of Mexican Indian blood and the textiles are therefore extremely interesting. Up to the present time very little has been known concerning their blankets, and the question of native Indian influence upon their products as well as the counter influence, presents a question well worthy of study. The bearing of this intrusion upon the Southwestern textiles is sure to form an interesting chapter in the history of this primitive industry.

THE memoir on "The Material Life of the Chukchee," by Mr. Waldemar Bogoras, has been completed. It was presented at the International Congress of Americanists held in Stuttgart, in August.

DR. CLARK WISSLER, of the Department of Ethnology, has been pursuing his researches among the Black Foot Indians of Montana and the Canadian side of the border. He reports gratifying success in his investigations of the religious rituals of the Black Foot and has shipped to the Museum extensive collections illustrating their ceremonies. The Royal Ethnographical Museum in Berlin has made an arrangement by which Dr. Wissler has collected material for them as well as for this Museum.

MR. FRANK G. SPECK, of Columbia University, was in the Indian Territory during July and August collecting for the Museum material and linguistic information from the Uchee (a little-known tribe formerly resident in South Carolina), the stock affiliations of which have long been a puzzle to ethnologists. He reports gratifying progress.

DR. BERTHOLD LAUFER, who has been pursuing his researches in China for the past three years in the interests of the East Asiatic Committee, has reached Germany on his return journey and is expected to arrive in New York early in October to take charge of the installation of the collection made by him for the Museum, as well as to begin his lectures at Columbia University.

HONORABLE DEAN C. WORCESTER, Secretary of the Interior, Philippine Insular Government, has presented to the Museum a



## MUSEUM NEWS NOTES

series of nearly 600 photographs representing the different tribes inhabiting the islands of the Philippine group. The photographs are of excellent quality, and their value in the study of the ethnology of the islands is increased by the full notes accompanying them which were made by Mr. Worcester during his extensive travels in the islands.

A COLLECTION of rocks illustrating the geology of Manhattan Island and immediate vicinity has been installed at the north end of the Hall of Geology. The specimens have been arranged to illustrate sections across the island from west to east. Many of the specimens have come from the excavations which have been made for the Subway, while others were obtained before Manhattan Island was as fully covered with buildings as it is at present. The exhibit is accompanied with a geological relief map of the city and vicinity, which has been colored in accordance with the chart issued by the U. S. Geological Survey.

THE collections illustrating the 1902-1903 volcanic eruptions of Mont Pelé, Martinique, and the Soufrière of St. Vincent have been removed to the south end of the Hall of Geology, where the specimens have been arranged in A-cases and may be conveniently studied in connection with the relief map of Martinique which stands near by.

PROFESSOR HENRY FAIRFIELD OSBORN has had the honorary degree of Doctor of Science conferred upon him by the University of Cambridge, England.

THE Museum has completed a series of scrap-books containing prints of all the photographic negatives belonging to it. There are about 13,000 such negatives from all departments of the Museum, representing the work carried on by the institution. The photographs have been arranged according to the geographical distribution of the subjects, and they illustrate the geography, geology, mammalogy, ornithology, archaeology and ethnology of many parts of the globe. The photographs are accessible to persons desiring to make studies or to obtain illustrations for educational and scientific purposes.

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THE observation beehive, which was installed in one of the windows of the Hall of Entomology last spring, has proven a constant source of interest to the visitors to the Museum. The bees, some 10,000 in number, that make this hive their home, have been so industrious that the hive has been nearly doubled in size since it was first installed. The hive contains not less than seventy-five pounds of honey and is a practical illustration of what might be accomplished in the way of bee-keeping by any person in the city, at any rate by one living near the parks.

MR. BARNUM BROWN, of the Department of Vertebrate Palæontology, who has been carrying on exploring work in eastern Wyoming during the past season, reports that he has found two Plesiosaur skulls which are in the best and most nearly complete condition of any known to be in existence. With one of the skulls was associated most of the skeleton belonging to the individual. These finds will enable the department to place on exhibition a practically complete skeleton of this rare animal. Mr. Brown furthermore reports the finding of several more or less nearly complete skeletons of Mosasaurs.

MR. J. H. BATTY, who is conducting an expedition in Mexico for the Department of Mammalogy and Ornithology, reports satisfactory progress and has forwarded to the Museum a large quantity of material supplementing the extensive collection already in the building. The boxes comprising Mr. Batty's first shipment of the present expedition contained 274 specimens of mammals, 518 specimens of birds, about 400 specimens of serpents and reptiles and 64 specimens of invertebrates, together with the accessories needed for mounting some of the forms as groups. An important feature of the expedition is the number of negatives which has been taken.

MR. GEORGE H. SHERWOOD of the Department of Invertebrate Zoölogy spent about a fortnight in August at Southport, Maine, collecting marine invertebrates for the Museum series and for the work being carried on by the Museum in co-operation with the public schools. Among the material resulting from this expedition may be mentioned many beautiful hydroids, a



## MUSEUM NEWS NOTES

great quantity of the finger-sponge, sand-dollars by the hundred, many starfishes of several species, 1,500 sea-urchins (*Strongylocentrotus drobachiensis*) and hundreds of clam-worms (*Nereis*).

PROFESSOR FRANZ BOAS was one of the general introductory speakers in the Department of Anthropology of the International Congress of Arts and Sciences held at the St. Louis Exposition, September 19 to 25 inclusive. Dr. E. O. Hovey was one of the speakers in the section of Geo-Physics in the same Congress.

PROFESSOR MARSHALL H. SAVILLE was one of the International Jury of Award to examine and judge the collections in the group of Archaeology at the St. Louis Exposition.

AMONG recent noted visitors at the Museum may be mentioned Prince Hohenlohe-Schillingfürst and Prince von Ratibon and their parties; Prince Pu Lun, Imperial Chinese Commissioner to the St. Louis Exposition and the Chinese Ambassador; Mr. Heromich Shugio, Imperial Japanese Commissioner to the St. Louis Exposition, and Professor Yoshitaro Watanabe of the University of Tokyo; Professor A. C. Haddon of the University of Cambridge; Professors Edouard Seler and Karl von den Steinen of the University of Berlin; Professor L. Manouvrier of the School of Anthropology of Paris; a delegation of forty-two Italian electrical engineers who were sent by the government of Italy for a month's tour of the United States; Dr. Robert Bell, Director of the Canadian Geological Survey; Dr. Hjalmar Stolpe, Director of the Royal Ethnographic Museum at Stockholm; Mr. I. Jurriaan Kok, Director of the Royal Manufactory of Porcelain and Art Pottery at Roxenburg, The Hague, Holland; Dr. G. Bauer of the Royal Ethnological Museum, Berlin; Dr. C. W. Kimmins, Chief Inspector of the Education Department of the London County Council; M. Henri Moissan of Paris, and Dr. A. Smith Woodward of the British Museum (Natural History).

THE HONORABLE NICHOLAS PIKE has deposited in the Museum six volumes containing original water-color representations of more than 400 of the fishes inhabiting the waters of Mauritius. This valuable series of sketches was made by Mr. Pike between

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the years 1870 and 1873, while he was American Consul at Mauritius. Copious notes supplement the information conveyed by the sketches and some are further elucidated by means of careful drawings of the anatomy of the fish.

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### LECTURES.

In October the regular courses of lectures to the Members of the Museum, to the teachers and to the children of the public schools will be resumed in accordance with programmes to be issued later. The courses of "Free Lectures to the People" which are given in co-operation with the City Board of Education will likewise begin in October and continue to the middle of December as usual.

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### MEETINGS OF SOCIETIES.

The New York Academy of Sciences will hold its regular meetings at the Museum in accordance with the following programme:

October 3.—Business Meeting and Section of Astronomy, Physics and Chemistry.

October 10.—Section of Biology.

October 17.—Section of Geology and Mineralogy.

October 24.—Section of Anthropology and Psychology.

November 7.—Business Meeting and Section of Astronomy, Physics and Chemistry.

November 14.—Section of Biology.

November 21.—Section of Geology and Mineralogy.

November 28.—Section of Anthropology and Psychology.

December 5.—Business Meeting and Section of Astronomy, Physics and Chemistry.

December 12.—Section of Biology.

December 19.—Annual Meeting.

December 26.—Section of Geology and Mineralogy.

The Linnæan Society and the New York Entomological Society will resume their meetings at the Museum in October. Specific announcements in regard to the meetings of all these societies will be made in the "Weekly Science Bulletin" of the Scientific Alliance of New York.

## THE INSECT-GALLS OF THE VICINITY OF NEW YORK CITY.

BY WILLIAM BEUTENMÜLLER

EVERYWHERE throughout the woods, along the roadsides and in the fields, one finds on leaf or twig, stem or root peculiar swellings which evidently are not part of the normal growth of the plant. These deformations when produced by insects are called Galls. Generally one or more eggs are inserted in a bud, a flower, a leaf, a root or some other part of the plant, and the presence of this foreign body, together with the irritation caused by the larva among the vegetable cells, produces an abnormal growth of definite shape and uniform structure. The variety of Galls in respect to structure and substance is great. Every species of Gall-producing insect attacks its own particular plant and a particular part of that plant. Galls are of various sizes and colors and of almost every conceivable shape. Some resemble a tomato or a potato. Some are like the apple, plum, cherry and other small fruits. Some have the appearance of a pine-cone or a seed. They are smooth, wrinkled, downy, hairy or covered with spines and other protuberances. Some are succulent, while others are so fragile that they can be readily crushed, and still others are so corky, hard and woody that it requires a sharp knife to cut them. In color they are of many shades of green, yellow, red, brown and white.

The number of Galls formed by distinct species of insects and mites is so large that only a small proportion of the excrescences or of the insects causing them has yet been described. The present Guide Leaflet gives brief accounts, illustrated by figures drawn to a uniform scale, of some of the more conspicuous Galls made by members of the following families of insects found in the vicinity of New York City:

- (1.) **Hymenoptera** (CYNIPIDÆ and TENTHREDINIDÆ)—Gall-flies and Saw-flies.
- (2.) **Diptera** (CECIDOMYIDÆ, MYCETOPHILIDÆ and TRYPETIDÆ)—Flies.
- (3.) **Hemiptera** (PSYLLIDÆ and APHIDIDÆ)—Plant-lice and Jumping-lice.
- (4.) **Acarina** (ACARIDÆ)—Mites.

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Besides these groups, which are the principal Gall-producers, some few species of other orders (Coleoptera and Lepidoptera) also produce Gall-like excrescences.

In the following list, the Galls which have been found in the vicinity of New York City are arranged according to the plants upon which they occur. The serial numbers refer to the descriptions on the succeeding pages.

	Species No.		Species No.
<b>Wild Rose (<i>Rosa</i> sp.).</b>		<b>Black Oak (<i>Quercus velutina</i>).</b>	
<i>Rhodites bicolor</i> .....	1.	<i>Amphibolips confluentus</i> .....	14.
“ <i>radicum</i> .....	2.	<i>Andricus piger</i> .....	31.
“ <i>globulus</i> .....	3.	<i>Cecidomyia pilulæ</i> .....	66.
“ <i>dichlocerus</i> .....	4.	<b>Scrub Oak (<i>Quercus nana</i>).</b>	
“ <i>verna</i> .....	5.	<i>Amphibolips ilicifoliæ</i> .....	16.
✓ “ <i>rosæ</i> .....	6.	<i>Andricus punctatus</i> .....	20.
“ <i>ignota</i> .....	7.	“ <i>similis</i> .....	24.
“ <i>lenticularis</i> .....	8.	<i>Cecidomyia pilulæ</i> .....	66.
<b>Trailing Blackberry (<i>Rubus canadensis</i>).</b>		<b>Rock Chestnut Oak (<i>Quercus prinus</i>).</b>	
<i>Diastrophus bassettii</i> .....	9.	<i>Andricus papillatus</i> .....	23.
<b>Blackberry (<i>Rubus villosus</i>).</b>		✓ “ <i>petiolicola</i> .....	28.
<i>Diastrophus cuscuteæformis</i> ..	10.	<b>White Oak (<i>Quercus alba</i>).</b>	
“ <i>nebulosus</i> .....	11.	<i>Andricus seminator</i> .....	21.
<b>Black Raspberry (<i>Rubus occidentalis</i>).</b>		“ <i>jutilis</i> .....	22.
<i>Diastrophus radicum</i> .....	12.	“ <i>clavula</i> .....	25.
<b>Cinquefoil (<i>Potentilla canadensis</i>).</b>		“ <i>petiolicola</i> .....	28.
<i>Diastrophus potentillæ</i> .....	13.	“ <i>lana</i> .....	29.
<b>Scarlet Oak (<i>Quercus coccinea</i>).</b>		<i>Cynips pisum</i> .....	34.
✓ <i>Amphibolips confluentus</i> .....	14.	<i>Acraspis erinacei</i> .....	35.
“ <i>inanis</i> .....	15.	<i>Biorhiza forticornis</i> .....	36.
<i>Andricus punctatus</i> .....	20.	<i>Holcaspis globulus</i> .....	37.
<i>Cecidomyia pilulæ</i> .....	66.	<i>Neuroterus batatus</i> .....	41.
<b>Red Oak (<i>Quercus rubra</i>).</b>		<i>Cecidomyia poculum</i> .....	67.
✓ <i>Amphibolips confluentus</i> ....	14.	<b>Pin or Swamp Oak (<i>Quercus palustris</i>).</b>	
“ <i>inanis</i> .....	15.	<i>Andricus cornigerus</i> .....	10.
“ <i>cælebs</i> .....	17.	“ <i>palustris</i> .....	26.
“ <i>prunus</i> .....	18.	<i>Cecidomyia pilulæ</i> .....	66.
<i>Andricus singularis</i> .....	27.	<b>Black Jack Oak (<i>Quercus marylandica</i>).</b>	
<i>Cecidomyia pilulæ</i> .....	66.	<i>Andricus punctatus</i> .....	20.
“ <i>niveipila</i> .....	68.	<i>Cecidomyia pilulæ</i> .....	66.

# INSECT-GALLS OF THE VICINITY OF NEW YORK CITY

	Species No.		Species No.
<b>Swamp White Oak</b> ( <i>Quercus platanooides</i> ).		<b>Hickory</b> ( <i>Hickoria</i> sp.).	
✓ <i>Andricus petiolicola</i> .....	28.	<i>Cecidomyia holotricha</i> .....	56.
" <i>capsulus</i> .....	30.	" <i>caryæcola</i> .....	57.
<i>Cynips strobilana</i> .....	33.	" <i>tubicola</i> .....	58.
<i>Holcaspis duricaria</i> .....	38.	" <i>sanguinolenta</i> ....	59.
<i>Neuroterus pallidus</i> .....	40.	" <i>persicoides</i> .....	60.
" <i>noxiosus</i> .....	42.	✓ <i>Phylloxera caryæcaulis</i> .....	86.
" <i>floccosus</i> .....	43.		
" <i>umbilicatus</i> .....	44.	<b>Dogwood</b> ( <i>Cornus florida</i> ).	
		<i>Cecidomyia clavula</i> .....	64.
<b>Post Oak</b> ( <i>Quercus minor</i> ).		<b>Touch-me-not</b> ( <i>Impatiens biflora</i> ).	
✓ <i>Andricus petiolicola</i> .....	28.	<i>Cecidomyia impatiens</i> .....	65.
✓ <i>Dryophanta polita</i> .....	39.		
<b>Scrub Chestnut Oak</b> ( <i>Quercus prinoides</i> ).		<b>Goldenrod</b> ( <i>Solidago</i> sp.).	
<i>Cynips prinoides</i> .....	32.	<i>Cecidomyia solidaginis</i> .....	69.
		<i>Trypeta polita</i> .....	74.
<b>Wild Lettuce</b> ( <i>Lactuca canadensis</i> ).		" <i>solidaginis</i> .....	75.
<i>Aulax tumidus</i> .....	46.		
<b>Willow</b> ( <i>Salix</i> sp.).		<b>Grape</b> ( <i>Vitis</i> sp.).	
<i>Nematus pomum</i> .....	47.	<i>Cecidomyia viticola</i> .....	70.
<i>Euura ovum</i> .....	48.	" <i>vitis-pomum</i> .....	71.
✓ <i>Cecidomyia strobiloides</i> ....	61.	<i>Lasioptera vitis</i> .....	72.
" <i>rigidæ</i> .....	62.		
" <i>batatas</i> .....	63.	<b>Red Maple</b> ( <i>Acer rubrum</i> ).	
		<i>Sciara ocellata</i> .....	73.
<b>Alder</b> ( <i>Alnus rugosa</i> ).			
<i>Cecidomyia serrulatæ</i> .....	49.	<b>Hackberry</b> ( <i>Celtis occidentalis</i> ).	
		<i>Pachypsylla venusta</i> .....	76.
<b>Basswood</b> ( <i>Tilia americana</i> ).		" <i>celtidis-gemma</i> ...	77.
✓ <i>Cecidomyia verrucicola</i> .....	50.	" " <i>-vesiculum</i>	78.
		" " <i>-mamma</i> ..	79.
		" " <i>-cucurbitæ</i>	80.
<b>Tulip-tree</b> ( <i>Liriodendron tulipifera</i> ).			
<i>Cecidomyia tulipifera</i> .....	51.	<b>Witch Hazel</b> ( <i>Hamamelis virginiana</i> ).	
" <i>liriodendri</i> .....	52.	✓ <i>Hormaphis hamamelidis</i> ....	81.
		" <i>spinosus</i> .....	82.
<b>Wild Cherry</b> ( <i>Prunus serotina</i> ).			
<i>Cecidomyia serotinæ</i> .....	53.	<b>Elm</b> ( <i>Ulmus americana</i> ).	
<i>Acarus serotinæ</i> .....	87.	<i>Colopha ulmicola</i> .....	83.
<b>White Ash</b> ( <i>Fraxinus americana</i> ).		<b>Sumac</b> ( <i>Rhus glabra</i> ).	
<i>Cecidomyia pellex</i> .....	54.	<i>Pemphigus rhois</i> .....	84.
<b>Honey Locust</b> ( <i>Gleditschia triacanthos</i> ).		<b>Huckleberry</b> ( <i>Vaccinium</i> sp.).	
<i>Cecidomyia gleditschiæ</i> .....	55.	<i>Solenozopheria vaccinii</i> ....	45.
		<b>Poplar</b> ( <i>Populus</i> sp.).	
		<i>Pemphigus populicaulis</i> ....	85.

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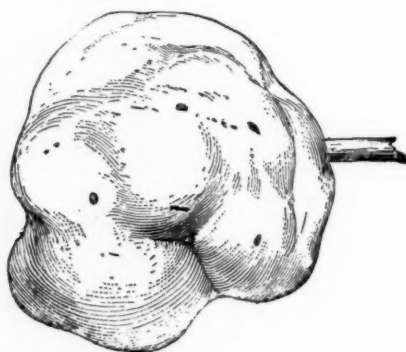
HYMENOPTERA. (Bees, Wasps etc.)

FAMILY CYNIPIDÆ (Gall-flies).

The species belonging to this family are small wasp-like insects termed Gall-flies because the majority of the species live within Galls. In the adult Gall-fly, the abdomen is usually much compressed and is joined to the thorax by a short peduncle. The wings have comparatively few veins, while some species are wingless. The antennæ are not elbowed. They consist of from 13 to 16 joints. The larvæ are maggot-like.



1. **Spiny Rose Gall** (*Rhodites bicolor* Harr.).—Spherical, covered with many long prickly spines. Yellowish green sometimes tinged with red in summer, and brown in winter. Soft in summer, woody in winter. Diameter  $\frac{3}{8}$  to  $\frac{1}{2}$  in. On twigs of wild roses. Rather common.



2. **Rose Root Gall** (*Rhodites radicum* Osten Sacken).—Irregularly rounded, with a deep impression above and below at place of attachment. Smooth, reddish brown. Pithy in substance, containing numerous cells. Length  $1\frac{1}{2}$  to 2 in. At roots of the wild roses. Not common.

## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY



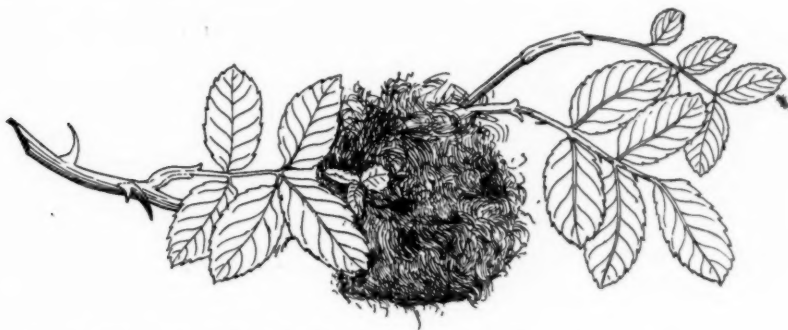
3. **Globular Rose Gall** (*Rhodites globulus* Beuten.).—Smooth, rounded or oblong, rising at each end abruptly from the branch. Rather soft and corky, containing numerous cells. About  $\frac{3}{4}$  to 1 in. long and  $\frac{3}{4}$  in. in diameter. On swamp rose (*Rosa carolina*). Not common.



4. **Long Rose Gall** (*Rhodites dichlocerus* Harr.).—Elongated, hard and woody, gradually tapering at both ends. Color reddish. Length from  $1\frac{1}{2}$  to almost 2 in. Width about  $\frac{1}{2}$  in. On stems of wild roses. Not common.



5. **Knotty Rose Gall** (*Rhodites verna* Osten Sacken).—Oblong or rounded and  $\frac{1}{2}$  in. long. Sometimes there is a series of three or more swellings attached to each other. Reddish, hard and woody, with many cells inside. On stems of wild roses. Not common.

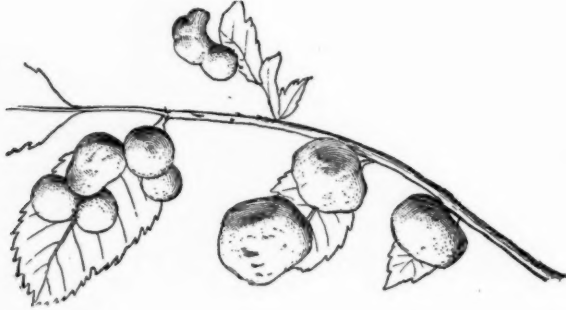


6. **Mossy Rose Gall** (*Rhodites rosæ* Linn.).—Composed of an agglomera-

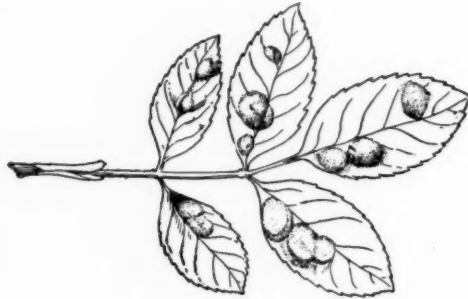


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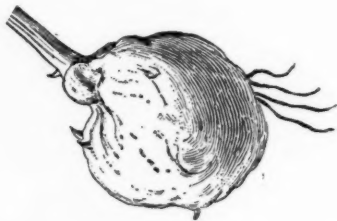
tion of hard cells around a branch and is densely covered with long green filaments forming a moss-like mass. About  $1\frac{1}{2}$  in. in diameter. On the twigs of sweet brier (*Rosa rubiginosa*). Common locally.



7. **Mealy Rose Gall** (*Rhodites ignota* Osten Sacken).—Round, woody, about the size of a large pea, and covered with a white mealy substance. Sometimes two or three coalesce, thus forming an elongated mass of more irregular shape. Inside are several cells. On leaves of wild roses. Common.



8. **Rose Lentil Gall** (*Rhodites lenticularis* Bass.).—Lentil shaped. In the parenchyma of the leaves of the wild rose (*Rosa lucida*).  $\frac{1}{10}$  to  $\frac{1}{2}$  in. in horizontal, and  $\frac{1}{8}$  in. in vertical diameter. Not common.



9. **Bassett's Blackberry Gall** (*Diastrophus bassettii* Beuten.).—Irregularly



## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY

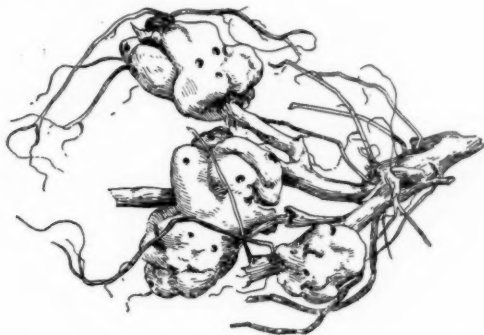
rounded or somewhat elongated. From about  $\frac{1}{2}$  to 1 in. in diameter. Composed of a pithy substance with many rounded cells inside. Greenish, tinged with red. On the stems of the trailing blackberry (*Rubus canadensis*), close to the ground. Not common.



10. **Blackberry Seed Gall** (*Diastrophus cuscuteiformis* Osten Sacken).—Consists of small globular, woody, seed-like bodies, pressed closely together, each provided more or less with spines. On stems of blackberry. Not common.



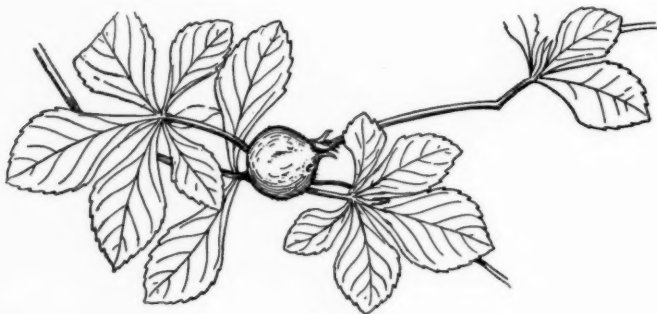
11. **Blackberry Knot Gall** (*Diastrophus nebulosus* Osten Sacken).—Oblong, surface somewhat uneven, with deep longitudinal furrows which divide the gall more or less completely into four or five parts. Length from 1 to 3 in. and diameter about 1 to  $1\frac{1}{2}$  in. Dark green, turning reddish as the season advances. Hard, corky, with many oblong cells inside. On stalks of blackberry (*Rubus villosus*). Very common.



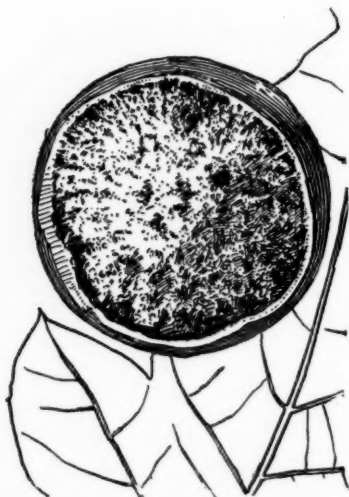
12. **Raspberry Root Gall** (*Diastrophus radicis* Bass.).—Irregularly rounded. Varying greatly in size and in shape from that of a pea to bodies

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nearly 2 in. in length and 1 in. in diameter. On roots of black raspberry (*Rubus occidentalis*). Common.

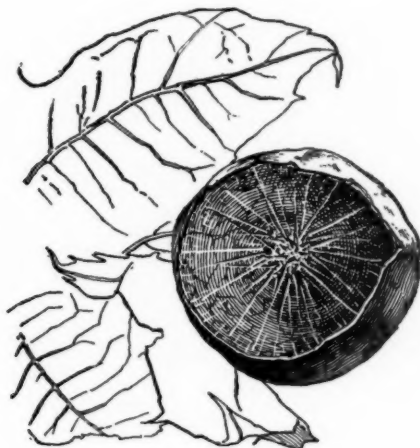


13. **Cinquefoil Axil Gall** (*Diastraphus potentillæ* Bass.).—Spherical or oblong, about  $\frac{1}{4}$  to  $\frac{1}{2}$  in. in diameter, containing a single cell. Green in summer; brown and spongy in winter. On axils of leaves of cinquefoil (*Potentilla canadensis*). Common.

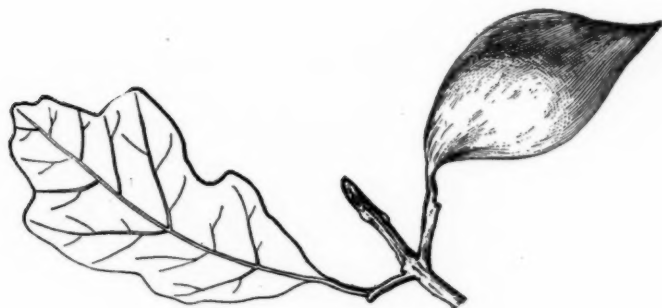


14. **Oak or May Apple** (*Amphibolips confluentus* Harr.).—Large, globular, more or less smooth outside and filled with a spongy substance, in the center of which is a hard woody kernel containing the larval cell. From 1 to 2 in. in diameter. When fresh, it is pale green, soft and succulent, with the contents whitish. Later in the season the shell becomes brown, hard and brittle, with the kernel woody and the spongy substance dark brown, but remaining soft. Confined to the leaves of the trees belonging to the red oak group. Common.

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15. **Empty Oak Apple** (*Amphibolips inanis* Osten Sacken).—Shape like the preceding, but considerably smaller. Almost empty, the larval cell being kept in position by radiating filaments. Green and soft when young; brown and brittle when dry. On leaves of scarlet (*Quercus coccinea*) and red oak (*Q. rubra*).

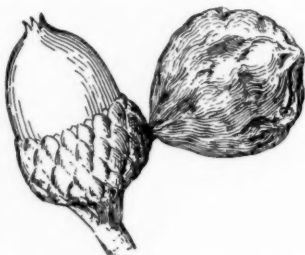


16. **Scrub Oak Gall** (*Amphibolips ilicifoliae* Bass.).—Elongated, fusiform, tapering at both ends, with the apex long and more slender than the base. Length about  $1\frac{1}{2}$  in.; width about  $\frac{1}{4}$  inch. Within is an elongated kernel held in position by radiating fibers. Green and soft in summer; brown and brittle in winter. On the leaves and petioles of dwarf oak (*Quercus nana*). Not common.

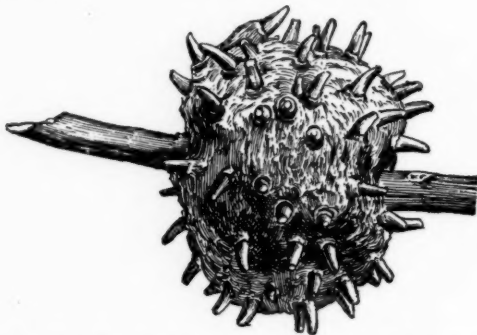
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17. **Oak Spindle Gall** (*Amphibolips cælebs* Osten Sacken).—Elongated, spindle-shape, soft and green. Contains a kernel held in position by radiating fibers. Length  $1\frac{1}{2}$  in. On leaf of red oak (*Quercus rubra*). Not common.



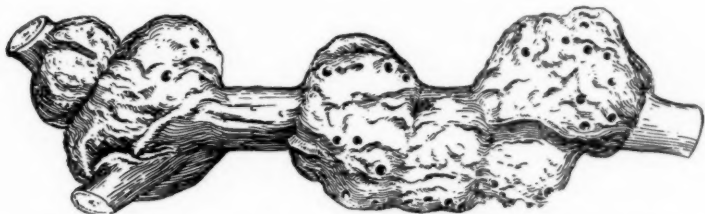
18. **Acorn Plum Gall** (*Amphibolips prunus* Walsh).—Globular, somewhat wrinkled or smooth, fleshy but solid; resembles a plum or cherry. About  $\frac{1}{2}$  to 1 in. in diameter. Bright crimson outside, pinkish inside and shading to yellow towards the center. In the center is a single cell in which the larva lives. On cup of acorn of red oak (*Quercus rubra*). August and September. Sometimes rather common.



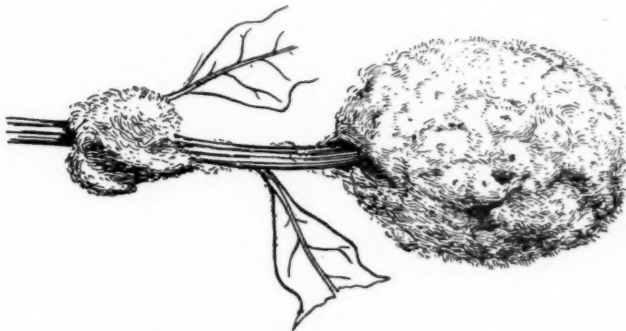
19. **Horned Knot Oak Gall** (*Andricus cornigerus* Osten Sacken).—Irregularly globular with many horn-like protuberances through which the gall-flies escape. Very hard and woody. Color of the branch. Inside brown with many larval

## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY

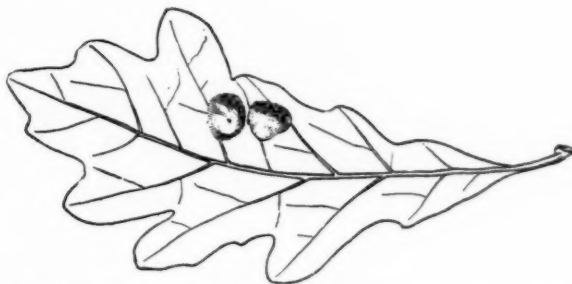
cells. About  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. in diameter. On branches of the pin oak (*Quercus palustris*). Exceedingly common throughout the year.



20. **Oak Knot Gall** (*Andricus punctatus* Bass.).—Shape similar to the preceding gall, but without the horn-like protuberances. Sometimes found singly, but often a number may be seen, in greater or less proximity, on the same branch. On black jack oak (*Quercus marylandica*), scarlet oak (*Quercus coccinea*) and rarely on scrub oak (*Quercus nana*). Common.



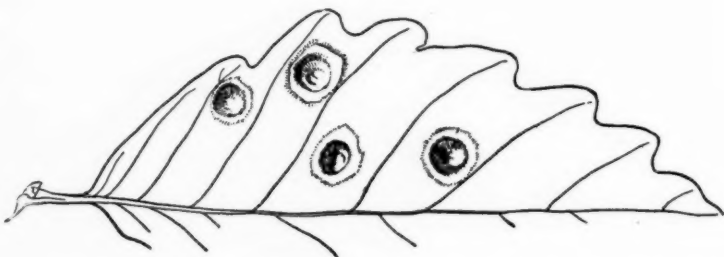
21. **Oak Seed Gall** (*Andricus seminator* Harr.).—Composed of a woolly substance and irregularly rounded. Inside are numerous bodies adhering to the twig and resembling canary seeds. About 1 to  $1\frac{1}{2}$  in. in diameter. Pure white sometimes tinged with red; toward the middle of the summer it assumes a rusty brown color and gradually drops off the twig. On twigs of white oak (*Quercus alba*). Common.



22. **Oak Wart Gall** (*Andricus futilis* Osten Sacken).—Rounded, somewhat

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flattened, projecting on both sides of the leaf. Inside are two or three seed-like, oblong kernels, kept in position by white filaments. Pale green. In numbers on leaves of white oak (*Quercus alba*). Very common.

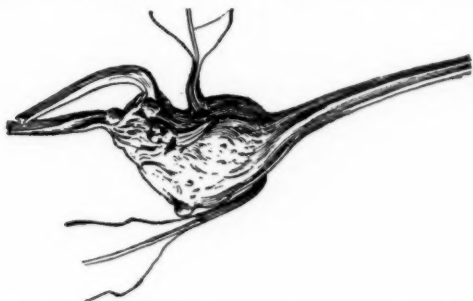


23. **Oak Nipple Gall** (*Andricus papillatus* Osten Sacken).—Rounded and somewhat nipple-shaped. Projects on both sides of the leaf and is enclosed in a reddish areola on the under side of the leaf. This is a very characteristic feature and distinguishes it from the preceding species. Inside are two or three kernels each containing a single larva. In numbers on leaves of chestnut oak (*Quercus prinus*). Common.



24. **Scrub Oak Club Gall** (*Andricus similis* Bass.).—Club-shaped, blunt at apex, which is generally turned to one side. Length  $\frac{1}{2}$  to 1 in. Hard and woody, with a few leaves growing from it in summer. On terminal twigs of scrub oak (*Quercus nana*). Not common.

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25. **White Oak Club Gall** (*Andricus clavula* Bass.).—Club-shaped, hard and woody, with a few leaves growing from it. Length  $\frac{1}{2}$  to 1 in. Green in summer; brown in winter. On tips of twigs of white oak (*Quercus alba*). Very common.



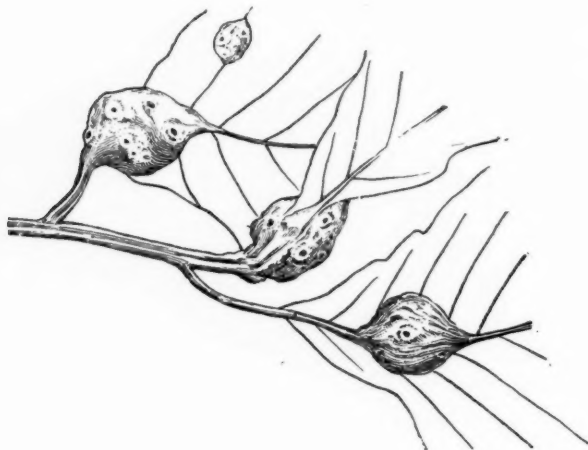
26. **Succulent Oak Gall** (*Andricus palustris* Osten Sacken).—Globular, green, succulent. Hollow inside, with a small seed-like kernel which rolls about freely. Diameter about  $\frac{1}{2}$  in. On buds and young leaves of pin oak (*Quercus palustris*). May.



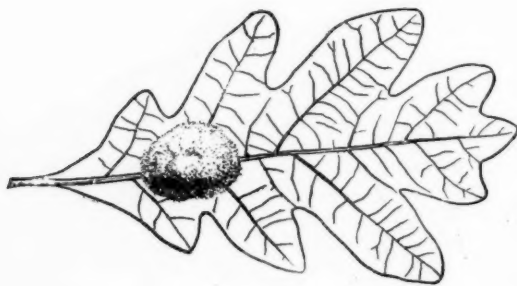
27. **Small Oak Apple** (*Andricus singularis* Bass.).—Globular, smooth,

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with an oblong kernel inside held in position by radiating fibers. Green and soft in spring; brown and brittle later in the season. Varies from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. in diameter. On leaves of red oak (*Quercus rubra*). Rather common.



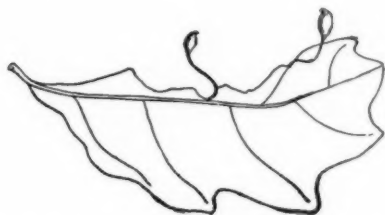
28. **Oak Petiole Gall** (*Andricus petioicicola* Bass.).—Rounded or club-shaped, hard and woody, with many cells inside. About  $\frac{3}{4}$  in. in diameter. Green in summer; brown in winter. On petiole, base or midrib of leaf of white oak (*Quercus alba*), chestnut oak (*Quercus prinus*), swamp white oak (*Quercus platanooides*) and post oak (*Quercus minor*). Common.



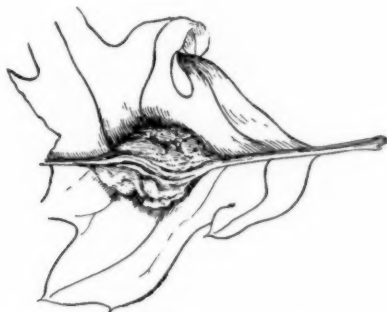
29. **Oak Wool Gall** (*Andricus lana* Fitch).—Very much resembles a mass of wool about  $\frac{5}{8}$  in. long. White or buff colored, inside with many small, bright chestnut colored, seed-like capsules, crowded together and attached by their lower ends to the vein of the leaf. On the under side of ribs of leaf of white oak (*Quercus alba*). Common.



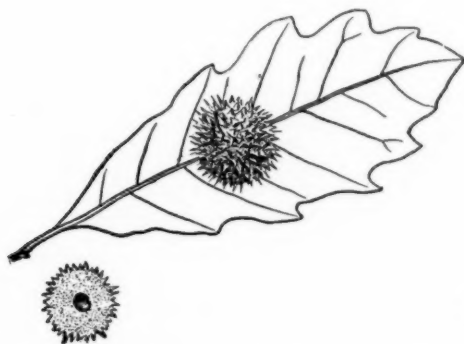
## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY



30. **Oak Capsule Gall** (*Andricus capsulus* Bass.).—Oval and attached to a pedicel,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long. Resembles the capsule of certain mosses. On the margin of leaf of swamp white oak (*Quercus platanooides*). Not common.



31. **Oak Midrib Gall** (*Andricus piger* Bass.).—A large, irregular woody swelling on the midrib of leaf of black oak (*Quercus velutina*), always on the under side and usually on the lower half of the leaf. Upper side indicated by a widening of the midrib and a slight depression of the leaf at that point. Rather common.

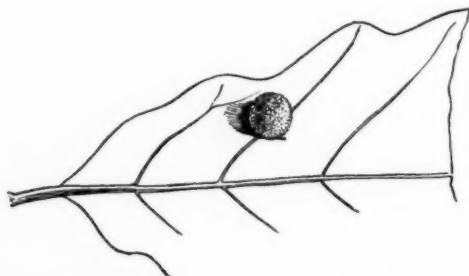


32. **Spiny Oak Gall** (*Cynips prinoides* Beuten.).—Globular, covered with numerous cone-like projections, hard and woody, with a small cell inside. About  $\frac{1}{2}$  in. in diameter. Green, tinged with red. On upper side of leaf of dwarf chestnut oak (*Quercus prinoides*). Not common.

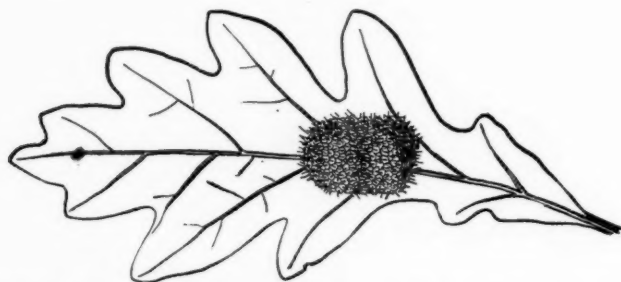
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33. **Pine-Cone Oak Gall** (*Cynips strobilana* Osten Sacken).—Consists of many wedge-shaped bodies, closely packed together, with their pointed bases attached to a common center. Hard and corky with a single cell in each. They break off readily when dry. On twigs of swamp white oak (*Quercus platanooides*). Not common.



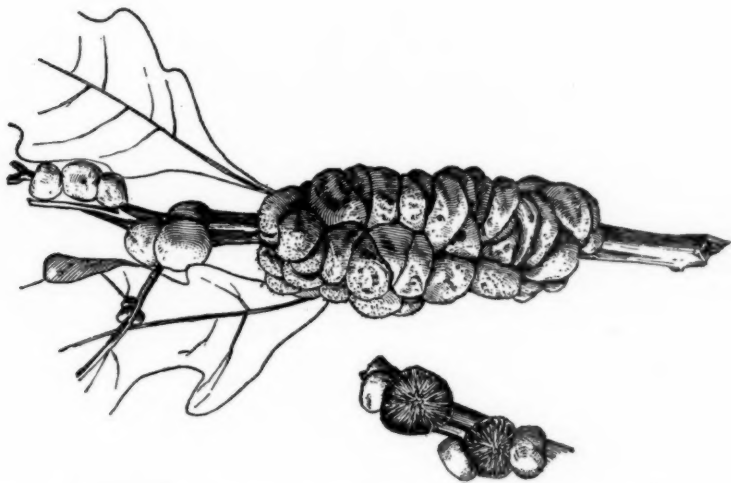
34. **Oak Pea Gall** (*Cynips pisum* Fitch).—Globular, green and about the size of a pea, which it resembles in general appearance. Surface finely netted with fissures or cracks and intervening elevated points. Inside are two cavities divided in the middle by a thin partition. On upper and under sides of leaves of white oak (*Quercus alba*).



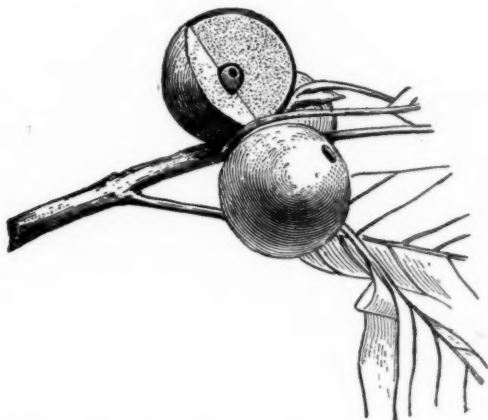
35. **Oak Hedgehog Gall** (*Acraspis erinacei* Walsl.).—Rounded or oblong

## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY

oval, covered with numerous, rather long spines. Length about  $\frac{3}{4}$  in. Yellow or greenish yellow with the spines bright red, especially when young. On one of the principal veins of leaf of white oak (*Quercus alba*). Common.



36. **Oak Fig Gall** (*Biorhiza forticornis* Walsh).—Consists of many small, soft, bladder-like bodies, each containing a single cell, which is held in position by radiating fibers. They are closely pressed together and somewhat resemble figs packed in boxes,—hence the name "Fig Gall." Pale yellow, often beautifully tinged with bright red. Brown in winter. On twigs of white oak (*Quercus alba*). Common.



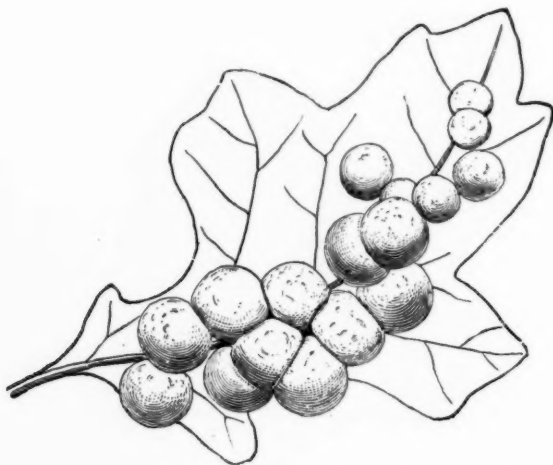
37. **Oak Bullet Gall** (*Holcaspis globulus* Fitch).—Bullet-like, corky, with a small cavity in the center containing a single larva living in an oval, whitish

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shell. Yellow, tinged with red in summer; brown in winter. Grows singly or in clusters of two or three on terminal twigs of white oak (*Quercus alba*). Common.

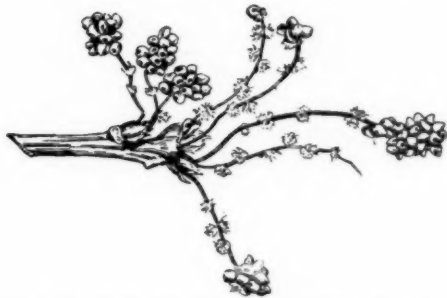


38. **Pointed Bullet Gall** (*Holcaspis duricaria* Bass.).—Globular, with a short point at the apex. Hard and woody, with a small cavity in the center containing a small oval, whitish shell in which the larva lives. Yellow and tinged with red in summer; brown in winter. On terminal twigs of swamp white oak (*Quercus platanooides*) growing singly or in clusters of two or more. Common.

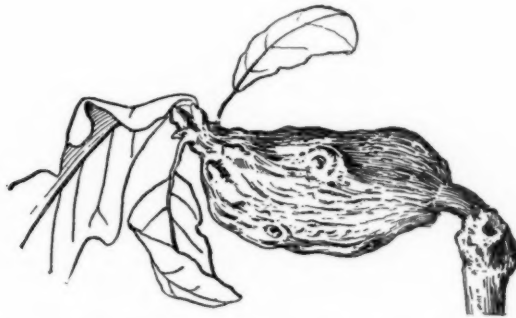


39. **Polished Oak Gall** (*Dryophanta polita* Bass.).—Globular, smooth, with a thin outer shell. Inside is a single round cell held in position by radiating fibers. Pale green, sometimes tinged with red, and about  $\frac{1}{4}$  to  $\frac{3}{4}$  in. in diameter. On both surfaces of the leaves, at or near the summit of young and thrifty shoots, of post oak (*Quercus minor*). Grows singly or in clusters. August and September. Not rare in the pine barrens of New Jersey.

## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY



40. **Oak Flower-Stem Gall** (*Neuroterus pallidus* Bass.).—Small, unevenly globular, smooth and of a fine, soft cellular consistence. Pale wood color. In masses on flower stems of swamp white oak (*Quercus platanooides*). Not common.

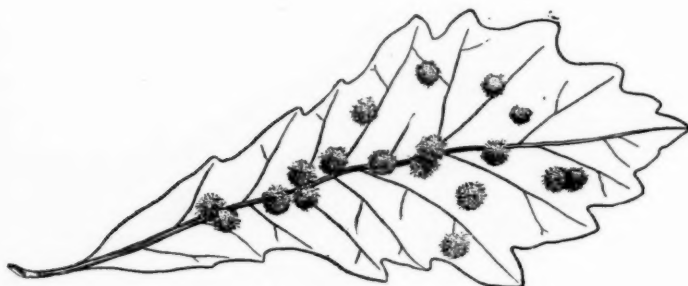


41. **Oak Potato Gall** (*Neuroterus batatus* Fitch).—Generally large and uneven, often resembling a potato in shape. Hard and woody, the surface being coated with a pale bluish bloom. Inside it is dense, corky, with many larval cells. On white oak (*Quercus alba*) below the terminal shoot. Common.

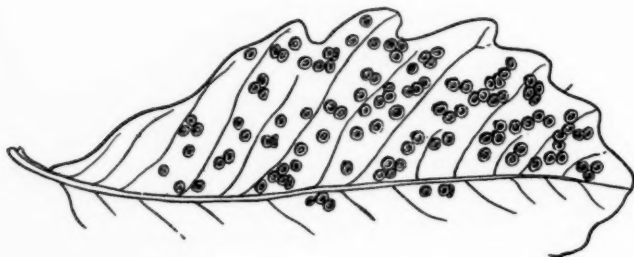


42. **Noxious Oak Gall** (*Neuroterus noxiosus* Bass.).—Irregularly rounded, hard and woody, with many larval cells inside. On the terminal twigs of swamp white oak (*Quercus platanooides*). Common.

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43. **Oak Flake Gall** (*Neuroterus floccosus* Bass.).—Small, hemispherical, covered with white hairs. Found in numbers on the under side of leaf of swamp white oak (*Quercus platanooides*). On the upper side of the leaf it is indicated by a small, smooth, shining blister-like elevation. Common.

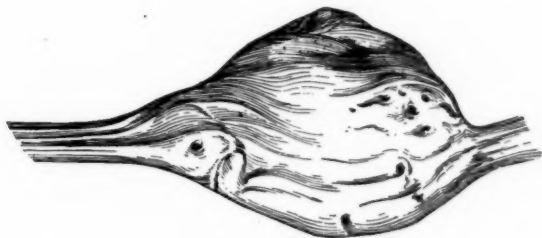


44. **Oak Button Gall** (*Neuroterus umbilicatus* Bass.).—Small, rounded, much depressed, with a rather deep cavity on top, in the center of which is a minute nipple. About  $\frac{1}{10}$  in. in diameter. Found in numbers on the under side of leaf of swamp white oak (*Quercus platanooides*). On the upper side of the leaf it is indicated by a circular spot. Common.



45. **Huckleberry Gall** (*Solenozopheria vaccinii* Ashm.).—Rounded, elongate, concave at place of attachment to the stem, turning the same downward. Green and pithy in summer; brown, hard and woody in winter. On stems of huckleberry. Common.

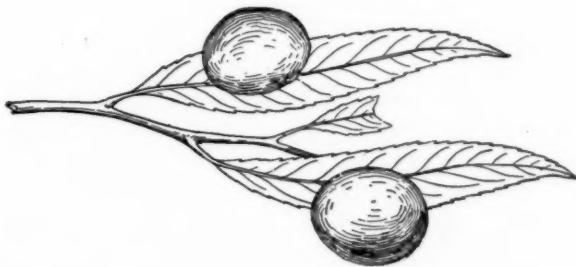
## INSECT-GALLS OF THE VICINITY OF NEW YORK CITY



46. **Lettuce Tumor Gall** (*Aulax tumidus* Bass.).—Varies greatly in shape and size from a slight, knotty and irregular enlargement of the stalk to a large and more or less ovate swelling, 2 to 3 in. long and 1 in. in diameter. Inside it is pithy and filled with many cells. Found on the main stalk of wild lettuce (*Lactuca canadensis*), usually near the summit, often in the panicle itself, and then covered with the short flower stems. Common.

### FAMILY TENTHREDINIDÆ (Saw-flies).

With few exceptions the members of this family do not produce galls, the larvæ being leaf-eaters. The larvæ very much resemble the caterpillars of butterflies and moths, but they have, ordinarily, from 12-16 prolegs, while true caterpillars have as a rule only 10. The adult female is furnished with a pair of saws at the end of the abdomen which she uses to make slits in the leaves and stems of plants in which she places her eggs.



47. **Willow Apple Gall** (*Nematus pomum* Walsh).—Rounded and fleshy, somewhat resembling a miniature apple. Yellowish green, usually with a rosy cheek. Measures about  $\frac{1}{2}$  in. in diameter. On leaves of bush willow. July and August. Rather common.



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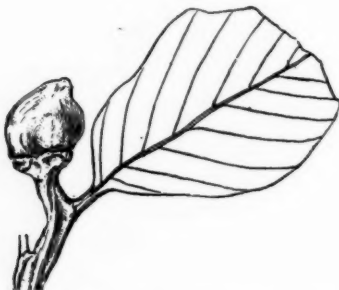
### DIPTERA (Flies).

#### FAMILY CECIDOMYIIDÆ (Gall-gnats).

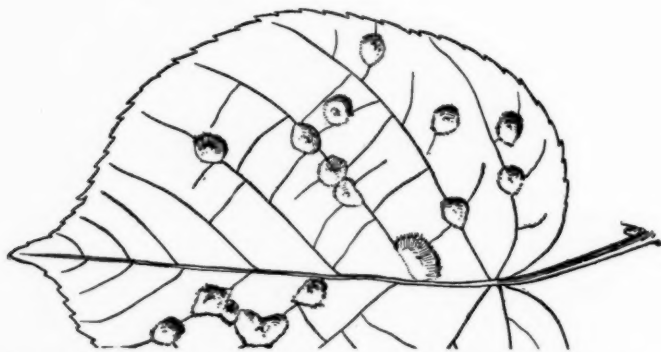
The members of this family are minute flies with the wings and body clothed with long hairs. The larvæ are small brightly-colored maggots, being red, pink, yellow or orange.



48. **Willow Egg Gall** (*Euura ovum* Walsh).—Oval or elongated. Placed lengthwise on one side of a twig, often in a row of two or more. Hard and woody. On the stems of bush willow growing in swampy places. Rather common.



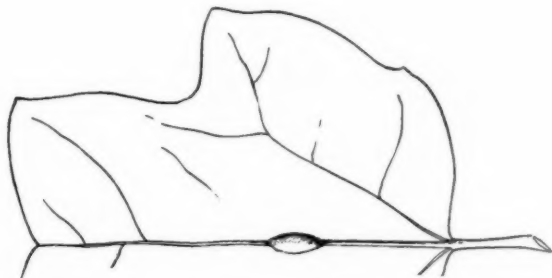
49. **Alder Bud Gall** (*Cecidomyia serrulata* Osten Sacken).—Rounded, bud-like, with the apex pointed, and often covered with a whitish bloom. Greenish in autumn and brown in winter. This gall is a deformation of the terminal bud of the common alder (*Alnus rugosa*). Rather common locally.



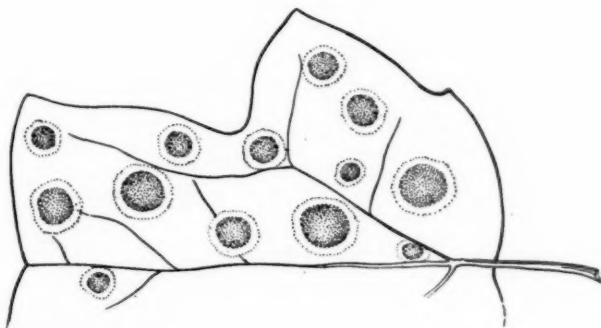
50. **Basswood Wart Gall** (*Cecidomyia verrucicola* Osten Sacken).—Rounded,

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wart-shaped, about  $\frac{1}{8}$  in. in diameter. In numbers on the same leaf of basswood (*Tilia americana*). July and August. Rather common.



51. **Tulip-tree Midrib Gall** (*Cecidomyia tulipifera* Osten Sacken).—A small rounded swelling on the midrib of the leaf of the tulip tree (*Liriodendron tulipifera*). Not common.



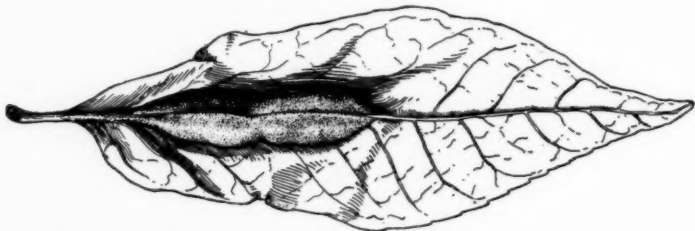
52. **Tulip-tree Spot Gall** (*Cecidomyia liriodendri* Osten Sacken).—Forms brown spots with a yellow or greenish areola on the leaves of the tulip tree (*Liriodendron tulipifera*). Common.



53. **Wild Cherry Bud Gall** (*Cecidomyia serotinæ* Osten Sacken).—Rounded, club-shaped, with one or two leaves growing from its sides. Bright red in

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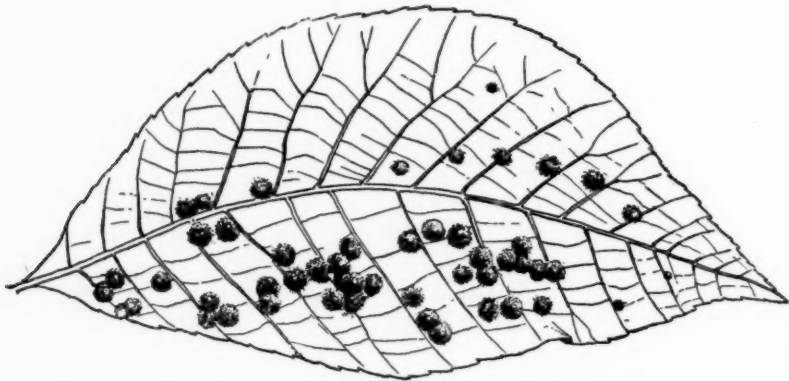
spring; brown in winter. This gall is an enlargement of the terminal bud of young shoots of the wild cherry (*Prunus serotina*). Common.



54. **Ash Midrib Gall** (*Cecidomyia pellex* Osten Sacken).—Rounded, oblong or very much elongated, succulent. Under side indicated by being somewhat swollen. Pale green, sometimes tinged with red. Length from 1 to 2 in. On midrib of leaf of ash (*Fraxinus americana*). May and June. Rather common.



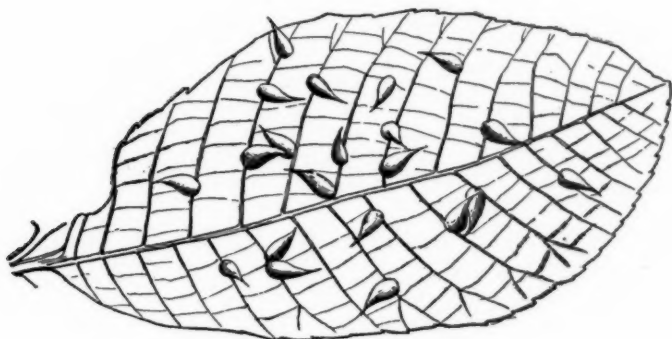
55. **Honey-locust Pod Gall** (*Cecidomyia gleditschiae* Osten Sacken).—Formed of a single leaflet in such a way as to assume the shape of a small pod. On the leaves of honey-locust (*Gleditschia triacanthos*). Sometimes nearly all the leaves on the terminal twigs are deformed in this way. Not common.



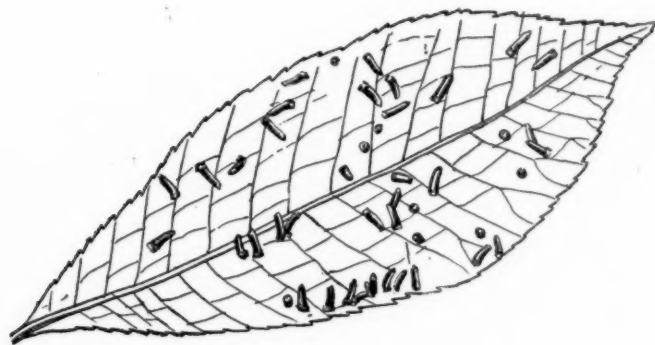
56. **Hickory Onion Gall** (*Cecidomyia holotricha* Osten Sacken).—Sub-

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globular, onion-shaped and covered with pubescence which is pale when the gall is young and growing, and becomes rust-colored when mature. Inside it is hollow and contains a single larva. On the under surface of the leaves of different kinds of hickory. Sometimes they cover the entire under surface of the leaf. Very abundant.

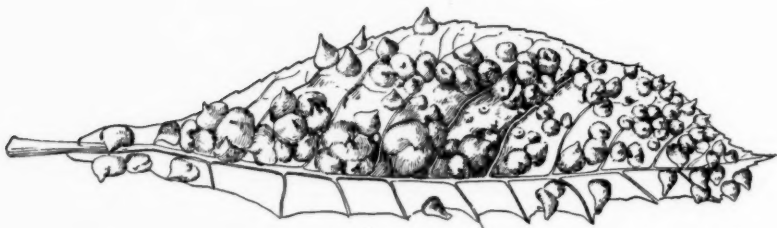


57. **Hickory Seed Gall** (*Cecidomyia caryæcola* Osten Sacken).—Smooth, elongated, rounded, with the tip produced into a point. Pale green. In clusters on the under surface of leaves of different kinds of hickory. Common.

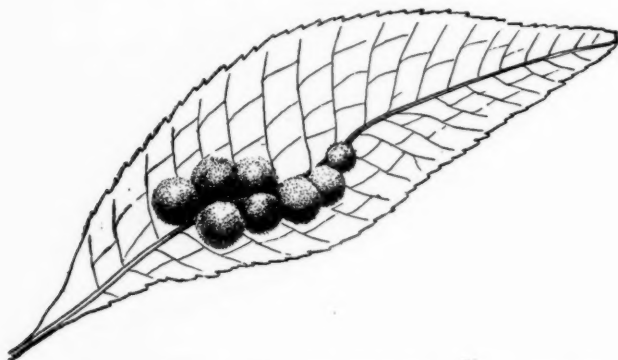


58. **Hickory Tube Gall** (*Cecidomyia tubicola* Osten Sacken).—Narrow, cylindrical, tube-like, inserted in a small protuberance on the leaf, breaking off very easily. Green when immature; black when fully grown. On under surface of the leaves of different kinds of hickory. Common.

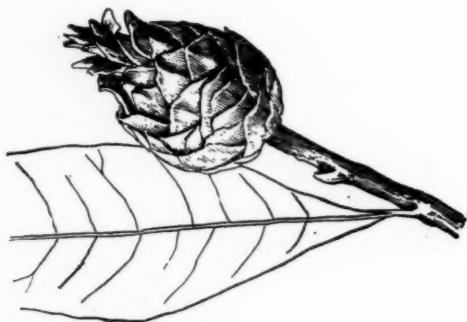
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59. **Hickory Cone Gall** (*Cecidomyia sanguinolenta* Osten Sacken).—Conical, somewhat narrowed at the base and of a blood red or purplish red color. In numbers on the under surface of the leaves of hickory. Not common.



60. **Hickory Peach Gall** (*Cecidomyia persicoides* Osten Sacken).—Variable in shape, usually rounded and clothed with delicate down like that of a peach, looking somewhat like a diminutive fruit of this kind. On the under surface of the leaves of hickory. Common.

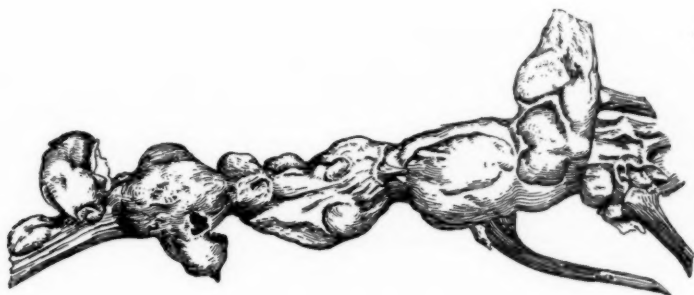


61. **Pine-Cone Willow Gall** (*Cecidomyia strobiloides* Osten Sacken).—Formed of closely imbricated leaves assuming the shape of a cone. On the terminal twigs of different kinds of low willow. Common.

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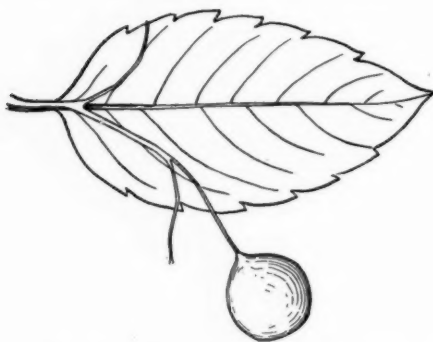
62. **Willow Club Gall** (*Cecidomyia rigida* Osten Sacken).—Elongated, club-like, tapering to a point at the apex, and with a number of small terminal buds growing from it. Length about  $\frac{3}{4}$  in. On tips of branches of low willow. Rather common.



63. **Willow Potato Gall** (*Cecidomyia batatas* Osten Sacken).—Irregularly rounded, varying considerably in size and in shape. Hard and woody. Sometimes the different forms are strung together, one after another, in more or less proximity, on the same twig. On branches of willow (*Salix discolor*). Common.



64. **Dogwood Club Gall** (*Cecidomyia clavula* Beuten.).—Club-shaped and about  $\frac{1}{2}$  to 1 in. long. Inside is an elongated channel inhabited by a single larva. Green in summer and the color of the bark in winter. On terminal twigs of dogwood (*Cornus florida*). Common.



65. **Touch-me-not Gall** (*Cecidomyia impatiens* Osten Sacken).—Globular, succulent, semi-transparent, containing a number of cells inside. At base of flower of touch-me-not (*Impatiens biflora*). August. Not common.



66. **Oak Pill Gall** (*Cecidomyia pilulae* Walsh).—Usually rounded, hard and woody. Frequently two or more galls are confluent and assume a very irregularly rounded or elongated form. Inside are several cells. Brown or green. On upper surface of leaves of different kinds of oak. Very common.



67. **Oak Spangles** (*Cecidomyia poculum* Osten Sacken).—Rounded, saucer-



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shaped. Pale red to light lavender. In clusters on under surface of leaf of white oak (*Quercus alba*). August and September. Common.

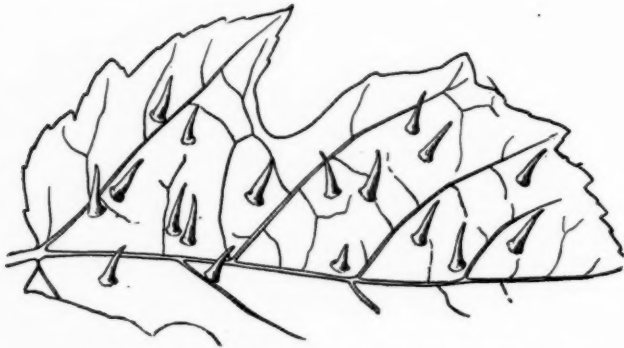


68. **Oak Fold Gall** (*Cecidomyia niveipila* Osten Sacken).—Consists of a large fold lined with white pubescence. Sometimes the entire leaf is folded with the edges curled, the under side of the leaf being inside of the gall. On red oak (*Quercus rubra*). May and June. Common.



69. **Goldenrod Bunch Gall** (*Cecidomyia solidaginis* Loew).—Produced by the arrest of the stalk, which causes the leaves to accumulate, thus forming a globular bunch, consisting of several hundred leaves. On goldenrod (*Solidago*) Very common.

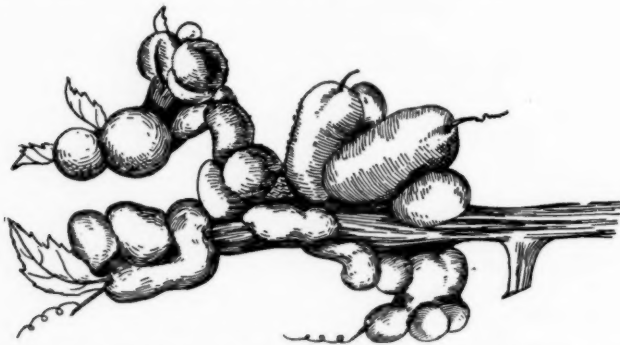
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70. **Grape-vine Tube Gall** (*Cecidomyia viticola* Osten Sacken).—Narrow, elongated or conical. Green or bright red. In numbers on upper side of the leaves of wild grapes. July and August. Not common.



71. **Grape-vine Apple Gall** (*Cecidomyia vitis-pomum* Walsh and Riley).—Variable in size and in shape, usually rounded, flattened at the base and pointed at the top. When mature the gall often has eight or nine longitudinal ribs, like a muskmelon. Inside are numerous longitudinal cells each divided by a transverse partition. On stems of wild grapes. Common.



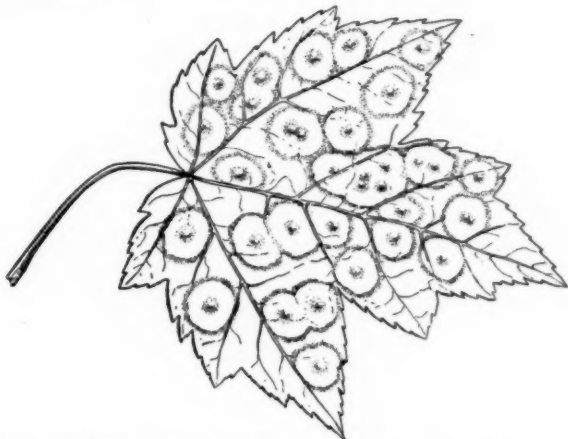
72. **Grape-vine Tomato Gall** (*Lasioptera vitis* Osten Sacken).—Consists of a bunch of irregular swellings of various rounded shapes. Soft, juicy and suc-

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culent. Yellowish green, tinged with red or entirely of this color. On stems and leaf stalks of wild grapes. May and June. Common.

### FAMILY MYCETOPHILIDÆ (Fungus-gnats).

The species of flies belonging to this family are of medium or small size and are more or less mosquito-like in form. Most of them feed on fungi and in damp places where there is decaying vegetable matter.



73. **Maple Spot Gall** (*Sciara ocellata* Osten Sacken).—Eye-like, circular, flat. Light yellow, with a red central dot, or entirely green or yellow. In numbers on the leaves of red maple (*Acer rubrum*). Common.

### FAMILY TRYPETIDÆ.

Only a certain number of species belonging to this family of flies produce galls. The wings of many of the species are beautifully marked with spots or bands.



74. **Goldenrod Gall** (*Trypeta polita* Loew) —Consists of a small bunch of

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accumulated aborted leaves,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long. Caused by the arrest of the side branches. Inside, at the base, is a hollow space in which the larva lives. On stalk of goldenrod (*Solidago altissima*). Singly or in numbers. Common.

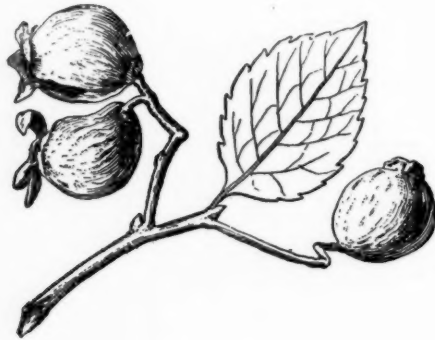


75. **Goldenrod Ball Gall** (*Trypeta solidaginis* Fitch).—Globular, ball-like and about 1 in. in diameter. Pithy inside with a rounded cell in the center. On the main stalk of goldenrod. Common.

### HEMIPTERA (Bugs).

#### FAMILY PSYLLIDÆ (Jumping Plant-lice).

The insects belonging to this family subsist entirely upon the juices of plants. They are comparatively small, measuring from  $\frac{1}{8}$  to  $\frac{1}{16}$  inch in length. Their hind legs are formed for jumping.

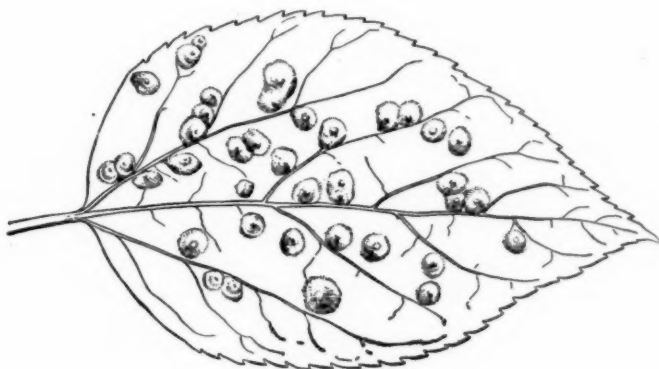


76. **Hackberry Petiole Gall** (*Pachypsylla venusta* Osten Sacken).—Globular or irregularly rounded. Consists of a thin outer shell with several compartments inside. On petiole of the leaf of hackberry (*Celtis occidentalis*). Not common.

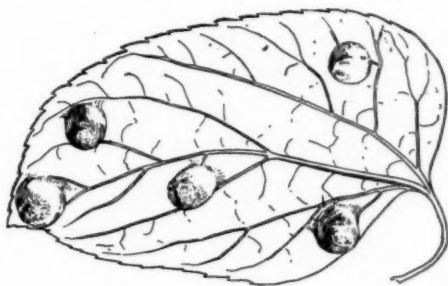
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77. **Hackberry Nodule Gall** (*Pachypsylla celtidis-gemma* Riley).—Variable in size and in shape. Bud-like and looking as if formed by the agglomeration of a number of rounded nodules. Hard and woody, with a number of cells inside. On branches of hackberry (*Celtis occidentalis*). It is a deformation of the young bud. Common.



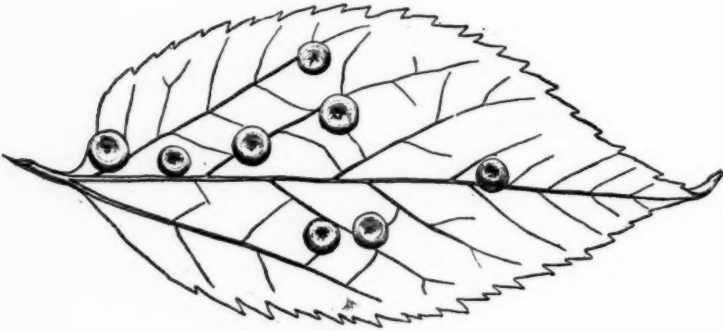
78. **Hackberry Blister Gall** (*Pachypsylla celtidis-vesiculum* Riley).—Circular, flat and blister-like. Convex on the under side with a small nipple in the middle. Green. In numbers on leaf of hackberry (*Celtis occidentalis*). Common.



79. **Hackberry Nipple Gall** (*Pachypsylla celtidis-mamma* Riley).—Repre-

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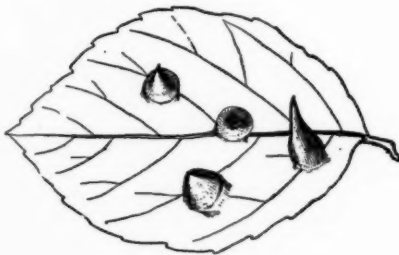
sented by a cup-shaped impression on the upper side of leaf and on the under side it is sub-cylindrical, with the apex rounded bluntly. About  $\frac{1}{4}$  in. high and  $\frac{1}{8}$  in. wide. On leaf of hackberry (*Celtis occidentalis*). Common.



80. **Hackberry Melon Gall** (*Pachypsylla celtidis-cucurbitæ* Riley).—Under side rounded, truncated at apex and concave in the middle, with a small nipple. Around the top is usually an acute ridge which surrounds the concave depression, and at the sides near the top are short ribs which are sometimes nearly obliterated. Represented by a cup-shaped impression on upper side of leaf. On under side of leaf of hackberry (*Celtis occidentalis*). Common.

### FAMILY APHIDIDÆ (Plant-lice).

The plant-lice are well-known insects and infest nearly all kinds of plants. Comparatively few produce galls.

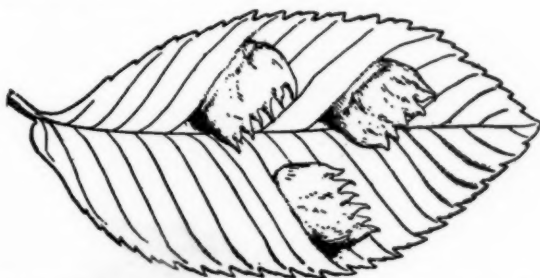


81. **Witch Hazel Cone Gall** (*Hormaphis hamamelidis* Fitch).—A conical swelling on upper side of leaf of witch hazel (*Hamamelis virginiana*). Very common.

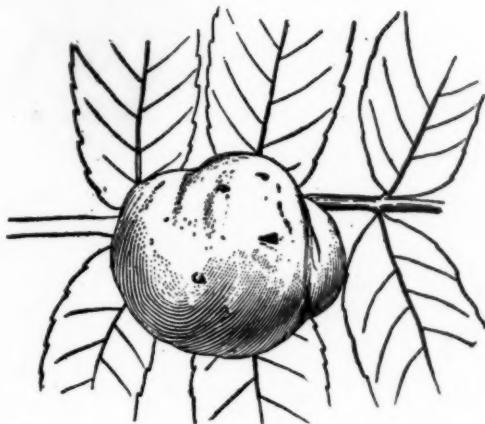
# INSECT-GALLS OF THE VICINITY OF NEW YORK CITY



82. **Spiny Witch Hazel Gall** (*Hormaphis spinosus* Shiner).—A deformation of the fruit bud, covered with a number of rather long spines, with a funnel-like exit at the base. Green in summer; brown in winter. On witch hazel (*Hamamelis virginiana*). Common.



83. **Cock's Comb Elm Gall** (*Colopha ulmicola* Fitch).—Forms a cock's comb, blubber-like growth on the upper side of the leaf of the elm (*Ulmus americana*). June. Common.

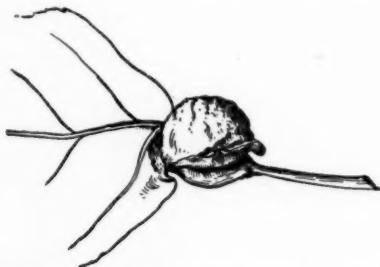


84. **Sumac Tomato Gall** (*Pemphigus rhois* Fitch).—Smooth, rounded.



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somewhat resembling a tomato in shape. Inside it is hollow and filled with lice. Yellowish green, tinged with red. On under side of leaf of smooth sumac (*Rhus glabra*) and stag-horn sumac (*Rhus typhina*). Common.



85. **Poplar Stem Gall** (*Pemphigus populicaulis* Fitch).—Irregularly globular, with a mouth-like orifice at the base on one side. On poplar at the junction of the stem and the leaf. Common.

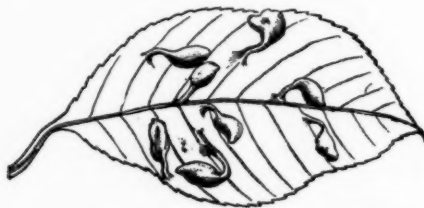


86. **Hickory Louse Gall** (*Phylloxera caryocaulis* Fitch).—Globular or hickory-nut shape. Hollow inside and filled with lice. When fully grown it bursts open and becomes cup-shaped. Green and leathery. On twigs and leaf-stalks of hickory. May and June. Very common.

### ACARINA. (Mites.)

#### FAMILY ACARIDÆ.

The members of this order are minute insects closely allied to the spiders. They are parasitic upon animals, man and plants; a certain number produce galls.



87. **Wild Cherry Pouch Gall** (*Acarus serotina* Beuten.).—Stem-like, expanding at the end into a pouch-like sack. About  $\frac{3}{8}$  in. long. Hollow, with an exit on under side of leaf. Green or red. In numbers on leaf of wild cherry (*Prunus serotina*). Common.

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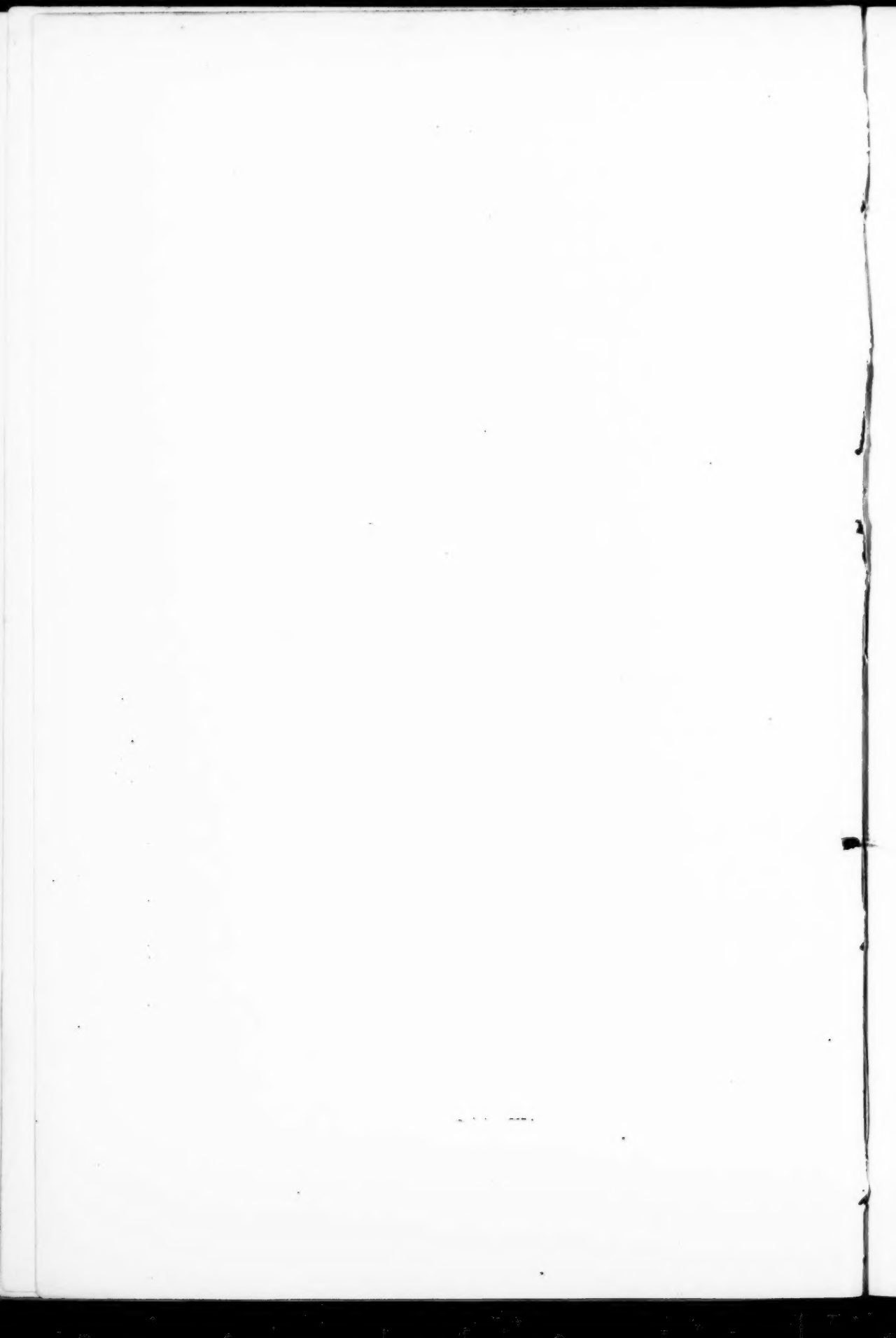
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